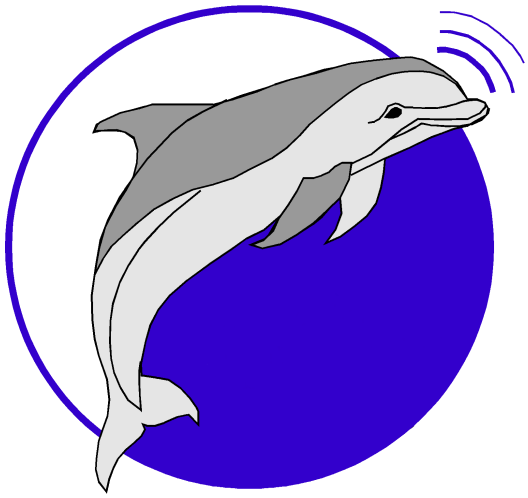

Sea Scan® PC Operator's Manual Version 1.8.5

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White Marsh, VA

This product was designed and developed by a team of engineers at Marine Sonic Technology, Ltd.

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Section 1

- **Getting Started**

1 Getting Started

1.1 What Is The Sea Scan PC?

The *Sea Scan PC* is a side scan sonar system. The system consists of the sonar hardware and a suite of software applications that allow the operator to acquire, review and process the sonar data. The sonar is designed for use as a towed system; however, it may be adapted for use in a submersible or ROV environment.

1.2 How This Manual Is Organized

This manual is organized in multiple sections with additional appendices. Each section, which is based on content, consists of different chapters. Each chapter discusses a different topic related to the section.

Section 1: Getting Started 3
This section provides an introduction to the *Sea Scan PC* and some basic introductory information for the new user.

Section 2: Equipment 5
This section describes the *Sea Scan PC* equipment. This section is provided as a separate document that is customized for each *Sea Scan PC* configuration.

Section 3: Sonar Operation 7
This section provides important procedures and tips for the safe operation of the *Sea Scan PC*.

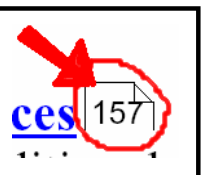
Section 4: Sea Scan PC Software 19
This section describes the *Sea Scan PC* application in detail. It outlines the features and capabilities of the data acquisition software.

Section 5: Sea Scan PC Review Software 97
This section describes the *Sea Scan PC Review* application in detail. It outlines the features and capabilities of the review software.

Section 6: External Devices 140
This section describes the optional external devices for the *Sea Scan PC*. The interaction of the external devices with both the *Sea Scan PC* and *Sea Scan PC Review* applications are outlined.

Section 7: Appendices 167
The appendices provide additional information that is not essential to the normal operation of the *Sea Scan PC*, but may be helpful and of interest to you. The subjects include, but are not limited to: Sea Scan PC file formats, Book References, Windows XP issues, Troubleshooting information, etc.

Note: In order to keep the size of the PRINTED Manual to minimum we have included references to other sections. These references will have an icon next to them that includes a page number. Simply refer to the page number that is inside of the icon to find the page that is referred to.



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1.3 Introduction

Welcome to the *Sea Scan PC*. This section tells you what is included with the Sea Scan package. It also provides installation instructions and suggests some quick start up tips.

If you are unfamiliar with operating a side scan sonar please read the rest of the *Sea Scan PC User's Manual*. To complement the manual we highly recommend either *Side Scan Sonar Record Interpretation*, by Charles Mazel, or *Sound Underwater Images: A Guide to the Generation and Interpretation of Side Scan Sonar Data*, by John P. Fish and H. Arnold Carr. The up-to-date book by Fish and Carr, although technically detailed in parts, is an excellent reference book for both beginners and experts. The book by Charles Mazel is geared more towards the beginner. Both are comprehensive works on the basic operations and principles of sonar systems. If you are not already an experienced side scan operator either of these books should greatly increase your operating capability and sonar record interpretation skill. It is highly recommended that the operator is familiar with the contents of at least one of these books, preferably the book by Fish and Carr, and the *Sea Scan PC User's Manual*.

We highly recommend you familiarize yourself with the Sea Scan PC software in training mode before using the system at sea.

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Section 2

- **Equipment**

2 Equipment

The *Sea Scan PC* equipment is described in a separate document that is customized for each configuration. Some of these documents are listed here:

- Maintenance, Trouble Shooting and Repair Manual for Sea Scan PC Splash Proof System
- Sea Scan PC Centurion - Operation, Troubleshooting and Maintenance
- Sea Scan PC Neptune - Operation, Troubleshooting and Maintenance

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Section 3

- **Sonar Operation**

3 Sonar Operation

3.1 Overview

This section provides important procedures and tips for the safe operation of the *Sea Scan PC*. To complement the manual we highly recommend the **books** 189 and **videos** 189 listed in our **Reference Lists** 189 in the Appendix.

3.2 Basic Side Scan Sonar Operation

The *Sea Scan PC* enables the operator to "view" wide tracts of the seafloor by insonifying along the swath width and recording the strength of the echoes from the sea bottom. The towfish is towed just above the bottom of the seafloor. The towfish continuously emits narrowly focused beams of sound perpendicular to the path of motion. The sound pulses pass through the water but are reflected from the seafloor and objects, such as wreck sites, on the seafloor. The control computer records the echo signal strengths as they return and then draws the entire sonar record line on the screen. An image of the seafloor is built, line by line, as the sonar record line from each pulse of the sonar is returned and drawn on the screen.

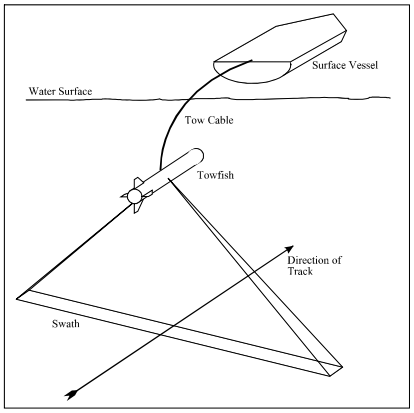

Figure 3-1 Basic Side Scan Sonar Operation

3.3 Setting Up The Sea Scan PC

3.3.1 Overview

The *Sea Scan PC* control computer may be set up anywhere on the survey ship. However, the control computer needs access to 120 VAC power, the *Sea Scan PC* tow cable and any external devices for navigation or fathometer information.

3.3.2 Power Supply Requirements for the Sea Scan PC

Typically, the *Sea Scan PC* requires a 120 VAC, 50-60 Hz power source. If your survey vessel supplies this nominal line voltage, use a three-prong circuit tester to ensure it conforms to the National Electric Code for three-wire line voltage.

WARNING!!!
Your survey ship's circuitry MUST have a properly grounded third wire. Under no circumstances should the *Sea Scan PC* be used until the line voltage has been properly tested.

Alternatively, the 120 VAC power may be derived from a frequency-controlled inverter connected to a D.C. power supply such as the vessel's 12 volt DC system. We have had excellent results with a 250 Watt or greater frequency-controlled Tripp-Lite inverter. (Trippe Mfg. Co., 500 N. Orleans St., Chicago, IL., 60610-4188. (312) 329-1777)

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3.3.3 Setting Up the Sea Scan PC Desktop System

The *Sea Scan PC* is a self-contained side scan sonar system. The *Sea Scan PC* software controls the collection of the sonar imagery and navigational input and displays the information for the operator on the computer screen. There is no need for an external sonar interface device. The towfish ping rate and sonar signal processing are performed by the interface card installed in the computer and controlled by the *Sea Scan PC* software.

The following provides a step-by-step description for setting up the *Sea Scan PC* hardware on a survey vessel:

1) Setup the computer system with the following items in mind:

- Screen Glare — Strong sunlight directly on the screen will result in poor screen visibility. Place a hood over the monitor to minimize screen glare or cover windows to eliminate direct sunlight.
- Splash Protection — Unless you have a waterproof or at least splash proof computer do not place the computer in an area that may become wet. If you are working in a splash area **place the components in a waterproof enclosure**.
- Communication — The sonar computer operator, pilot, and tow cable handler must be able to maintain clear and constant communication for the safe operation of the side scan sonar.
- Working Room — The computer operator should allow enough room for the keyboard and mouse. A hand-held trackball is recommended when the space required for a mouse is not available.
- Stability — The computer and monitor should be secured so they do not slide when the ship is underway or in heavy seas.
- Vibration — If the work area is subject to shock and vibration, then place the computer on shock absorbing material.

2) Plug in the tow cable.

Do NOT plug or unplug the tow cable when the sonar power is on. This may result in damage to the towfish and/or the interface board.

- If you have a tow cable handling system, plug the computer end of the computer-to-tow cable handling system cable into the connector marked *FISH* on the interface board.
- Or if you do not have a tow cable handling system, plug the computer end of the tow cable into the connector on the interface board.

3) Connect the GPS.

- Connect the NMEA 0183 output cable of the external GPS into one of the serial ports of the computer.

4) Secure all the system components and cables.

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The hardware system set up is complete. You may now turn the computer on and start the *Sea Scan PC* applications.

3.3.4 Settting Up the Sea Scan PC Towfish

3.3.4.1 Fin Ring Assembly Instructions

1) The first step in setting up the Sea Scan PC towfish is assembling the ring fin. Each Sea Scan PC towfish comes with a ring fin assembly that is detached from the towfish for shipping.

2) Slide the ring fin onto the towfish body.

3) After placing the ring fin onto the towfish body, align the threaded hole in the ring fin over the 1/4 inch hole in the towfish.

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4) This picture shows the threaded hole in the ring fin aligned with the 1/4 inch hole of the towfish.

5) Carefully start by hand the 10/32NF X1/2" brass screws into the threaded hole of the ring fin. **BE VERY CAREFUL, DO NOT CROSS THREAD.**

6) Use a small common head screwdriver to tighten the brass screws so they seat flush with the ring fin body.

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7) Picture shows ring fin properly installed.

3.3.4.2 Attaching the Tow Cable to the Towfish

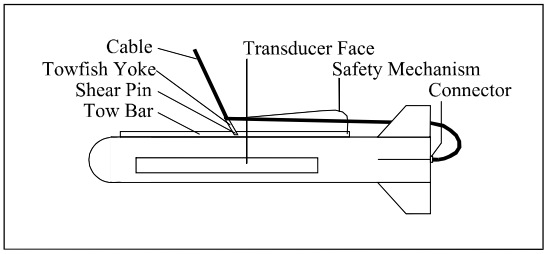

Figure 3-2 Towfish Components

The tow cable must be secured to the towfish. This is a relatively simple procedure, however, caution must be exercised to be sure the tow cable fastens securely to the towfish.

WARNING!!

Do not attach or disconnect the tow cable when the sonar power is on. This may result in damage to the towfish and/or the interface board.

To turn the sonar power is off, either:

- **Close the Sea Scan PC program.**
- **Ensure that the Power button in the Sea Scan tool bar indicates that the power is off. The Power button is gray when the power is off. Alternatively, the Power button in the Sea Scan tool bar is red when the power is on.**

1. Inspect the shear pin that attaches the towfish yoke to the towfish for wear. Replace the shear pin as required. The shear pin is a #6 x 1.5" RH brass machine screw.

2. Loop the tow cable strain relief device, the end loop of the safety mechanism cable and towfish yoke through the towfish shackle as illustrated below. Tighten the shackle bolt. Next safety tie the shackle. To do this, place a small tie wrap through hole in shackle bolt head and body of the shackle. This will ensure bolt will not back out. Both shackles should be safety tied. The tow cable is now properly secured to the towfish.

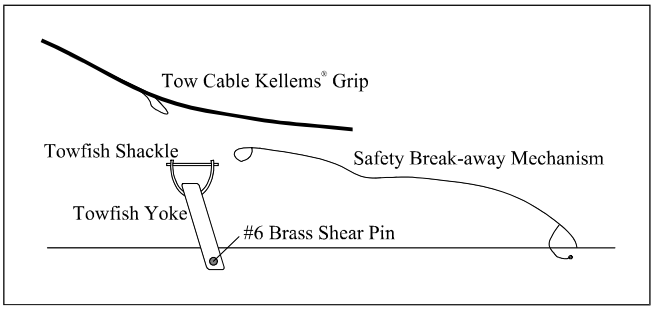

Figure 3-3 Terminal Hardware for Towfish

3. Prior to connecting it is recommended that WD40 be sprayed into both the towfish bulkhead connector and cable connector to remove any water or debris. After applying the WD40, use air to blow out the excess. Finally, plug the tow cable connector into the mating towfish

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connector on the back of the towfish, and tighten the locking ring snugly. Do not over tighten the locking ring.

WARNING!!

Always check the towfish and tow cable connectors for water and never plug a dry connector into a wet connector.

To clean and dry the towfish connector:
• Soak the connector in distilled water or alcohol.
• Blow the connector clear and dry with clean compressed air.

3.3.4.3 Testing the Towfish Connection

Before deploying the towfish into the water, test the towfish connection.

1. Make sure all the cables are connected and secured and then start the Sea Scan PC application.
2. Once the *Sea Scan PC* application has started, select the *Power* button from the Sea Scan tool bar to start the towfish pinging. Set the range to 10 meters and the apparent speed-over-ground to between 4 and 5 knots. If necessary, disable the speed-over-ground navigational input from the Sea Scan tool bar to set the system for manual speed-over-ground control. The screen image should begin to scroll rapidly showing the initial ping in the middle of each sonar record line.
3. Set both the left and right channel time-gain compensation (TGC) controls to their maximum settings. Refer to **Gain** 62 for more information on adjusting the TGC settings.
4. Place the tips of your fingers into the right or left transducer window. Rub briskly. Returns should be seen on the left and right channels of the sonar record lines. Ensure the TGC controls, the apparent speed-over-ground and the range have been set properly as described above.

3.3.4.4 Towfish Safety Mechanism

The tow cable connects to the towfish at the tow point, the ballast center of the fish. If the towfish is anchored on the bottom the safety mechanism is designed to shift the tow point towards the rear of the towfish. The shear pin holding the towfish yoke to the tow bar will release when stressed beyond its holding limit of approximately 300 pounds. This shifts the tow point towards the rear of the tow bar, lifting the towfish up and away from the anchoring debris. It is very important that the end loop of the safety mechanism cable is connected to the towfish shackle. Otherwise, the safety mechanism cable will not be connected, and when the shear pin releases the load will be transferred directly to the towfish connector. The resulting strain on the towfish connector will cause it to break.

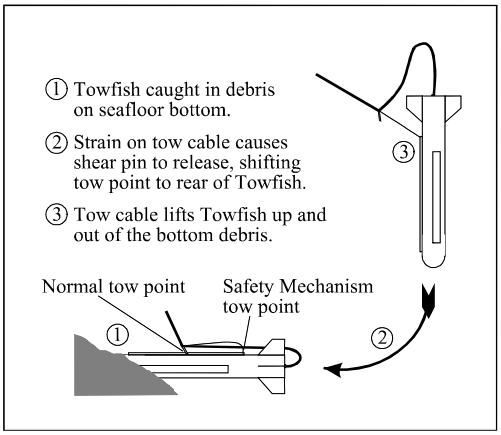
① Towfish caught in debris on seafloor bottom.
② Strain on tow cable causes shear pin to release, shifting tow point to rear of Towfish.
③ Tow cable lifts Towfish up and out of the bottom debris.
Normal tow point
Safety Mechanism tow point
①
②
③

Figure 3-4 Safety Mechanism Operation to Free Towfish from Anchoring Debris.

3.3.4.5 Deploying the Towfish

There are many safety issues to consider when deploying the towfish. The most typical, and incidentally the most dangerous, situation is deploying the towfish over the stern of your survey vessel.

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WARNING!!

Do not lower the towfish off the stern while underway. The propeller wash will cause very unpredictable towfish flying action and may suck the towfish under the vessel into the propellers.

Although it is generally safer deploying the towfish off the bow or over the side for shallow operations, it is still good practice to exercise caution and commonsense. We have found the following method the safest and easiest method of deploying the towfish.

1. Stop the survey vessel. It is not necessary to come to a complete stop, but slow the vessel down to at least a slow coast.
2. Place the engine in neutral in order to disengage the propellers.
3. If deploying the towfish off the stern and the bottom is reachable, lower the towfish to the bottom and then lift it off the bottom about six feet. Use the auto gain button in the gain window as soon as the towfish moves forward to initiate an auto gain operation. If the bottom is not reachable, lower the towfish to below the desired towing altitude. The computer operator can monitor the towfish altitude by watching the bottom and surface reflections on the screen. Use the reset button in the gain window to reset the gains.

If deploying the Towfish off the bow or over the side, let out the necessary amount of cable and then begin your survey run.

As the survey vessel slowly accelerates to the towing speed the towfish will lift further up from the bottom. This is caused by increased drag on the in-water cable. The interaction between cable drag, amount of in-water cable and tow speed will greatly affect the tow depth. This topic and other *Sea Operation* issues are discussed in detail in *Sound Underwater Images: A Guide to the Generation and Interpretation of Side Scan Sonar Data*, by John P. Fish and H. Arnold Carr.

3.3.5 Complete Sea Scan PC System

The entire *Sea Scan PC* system is now ready for operation. Refer to the following figure for a complete system diagram.

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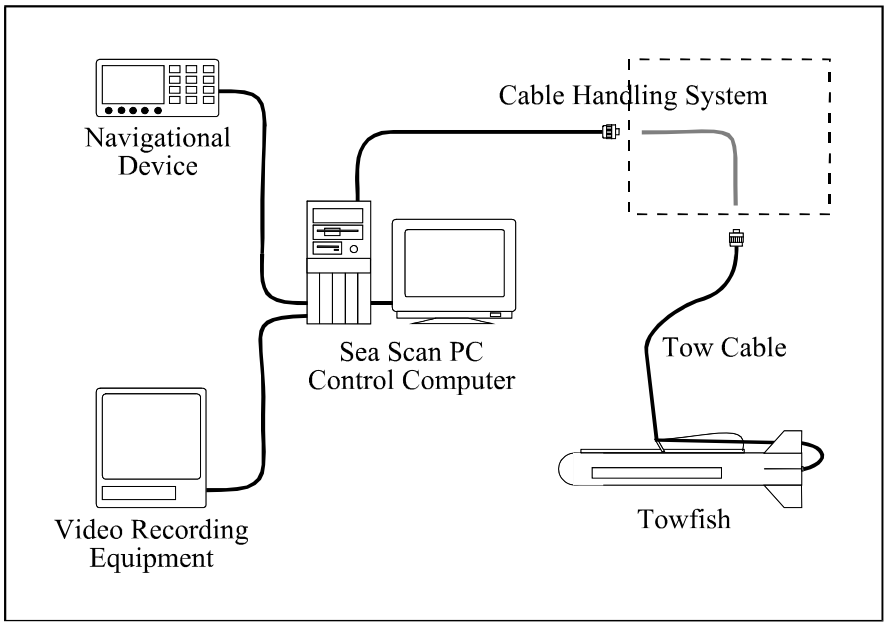

Figure 3-5 Complete Sea Scan PC System

3.4 Sea Scan PC Operation

3.4.1 Overview

This subsection will outline the general procedures for operating the *Sea Scan PC*. The outline assumes that a search or survey site is selected and towpaths are pre-plotted. This is a simplified version of an actual sonar operation and should serve only as a guideline for a more involved search operation.

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3.4.2 Starting the Operation

There are a number of elements that must be considered before starting a search or survey operation. The operator should determine a number of initial parameters to ensure the smooth beginning of the survey.

- If you have not already done so before you have left the dock, set up the *Sea Scan PC* system. Test all components of the system before leaving the dock, including either a rub test or a quick and simple in-water test of the towfish.
- Set the operating parameters in the *Sea Scan PC* application for the survey. Refer to **Operating Parameters** 34 and **Automatic Save** 88 for more details.
- Start your survey. Tow the fish in straight lines, called lanes. To ensure complete swath coverage, it is recommended to overlap successive lanes in a search area. If NMEA 0183 navigational information is available, the operator may monitor the ship's track and the estimated swath coverage during a search operation. Survey lanes may be marked on the plotter with waypoints. The survey ship may navigate from the plotter with these waypoints using the track survey feature.

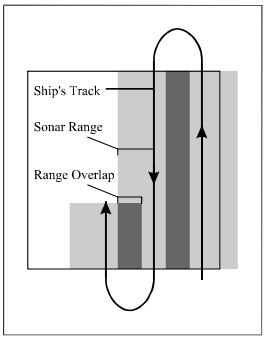

Figure 3-6 Search and Survey Pattern.

3.4.3 Search Methodology

3.4.3.1 Search Methodology Overview

A standard search involves several stages from pre-cruise planning to site feature identification. This manual assumes that the operator has defined a search area, planned search lanes, set up and deployed the towfish. We recommend the following scenario:

3.4.3.2 Site/Feature Location

The initial stage of the search involves finding a site/feature location. The operator may already have a marked latitude and longitude (L/L) position. In this case it should be a simple matter to locate the site. Otherwise, the search area should be methodically scanned in straight predetermined search lanes. As shown in figure 3-6 under **Starting the Operation** 15 in this section, to ensure complete swath coverage, it is recommended to overlap successive lanes in a search area.

1. Set the *Sea Scan PC* range to a “wide” setting.

   Keep in mind that the 600 kHz towfish has a limited range of approximately 75 meters on either side of the towfish. The 300 kHz towfish has a range of approximately 150 meters. The 150 kHz towfish has a range of over 500 meters. A wide setting will enable you to scan a large surface area of the seafloor. The search range defines the search lane spacing and the range overlap. Bottom terrain, site characteristics, such as size and composition, and sonar record interpretation experience should be considered when setting the initial search swath width. A large range will enable you to cover a large area in less time than it would using a shorter range. However, smaller features may be missed when the *Sea Scan PC* is set to a larger range.

2. Start the search pattern.

   You can monitor the progression of the search since the survey vessel's position and the estimated swath coverage are plotted on the Sea Scan plotter, as described in **Plotter** 38. The Sea Scan plotter may be placed such that the incoming data is not blocked from view, thus allowing you to easily monitor the search pattern and the incoming data simultaneously.

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3. When a feature is identified in the sonar record the location should be marked. If possible, throw a buoy off the stern on the side of the ship the feature was identified. Be aware that the buoy may drift in high currents. Note that the line connecting the buoy and anchor should be long enough for the anchor to reach the bottom. The buoy will serve as a visual marker for the pilot when trying to get back to the site for multiple passes as described later.

   The location may also be marked on the Sea Scan plotter. Following the directions outlined in **Plotter-Sonar Image Interaction** 55, mark the feature location on the plotter. The Sea Scan plotter and sonar record are closely related. When the navigational information is available each sonar record line can be associated with a L/L and swath coverage. Thus any feature seen in the sonar record can be associated with a known L/L position and location within the swath.

   The L/L position for the selected feature in the sonar record is logged in the marker list. The location is marked on the Sea Scan plotter with a marker if it is within the plotter boundary. Nonetheless, the operator, as a matter of good log keeping, should write the site latitude and longitude position in a logbook.

4. If the initial siting is a "good" record the operator may want to save the sonar record. This is very useful in the post processing stage for site location record keeping. If the site is marked on the plotter, the marker location is saved with the sonar image record. To save the data, select either the Save As... or the Save command from the File menu. Please refer to **Saving Data** 85 for more details about saving the sonar data to disk.

3.4.3.3 Site/Feature Identification

Once the site location is found the operator may use the Sea Scan PC to image the feature at a higher resolution.

1. Set the *Sea Scan PC* swath range to a shorter setting.

   The smaller the range the better the axial and transverse resolution. The feature will appear larger and with greater resolution with a shorter range. The *Sea Scan PC* is capable of very high resolution imaging with the 300 and 600 kHz towfish set at the 100, 50 and if possible 20 meter swath widths.

2. Make a closer pass of the feature.

   The towfish should not pass directly over the feature on the seafloor but to one side of the feature instead. The operator should guide the ship's pilot so the feature will appear on either the left or right side of the sonar record.

3. Save the high-resolution image of the seafloor feature. To save the data, select either the Save As... or the Save command from the File menu. Please refer to **Saving Data** 85 for more details about saving the sonar data to disk.

3.5 Safety

The *Sea Scan PC* is a simple system to operate. However, the simplicity of operation does not diminish the danger of operation. Any action that involves towing a body at the end of a cable at sea has an inherent danger involved. Many of the problems that occur at sea can be averted with common sense, good boat sense and experience.

Do not let the operation of the Sea Scan PC put your boat or your crew in a position of danger.

The books listed in **Books** 189 in the **Appendix** are written from years of field experience and are invaluable guides to the safe operation of a side scan sonar. This manual provides a short list of the

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common considerations for the safe operation of your *Sea Scan PC*:

Anchor the inner end of the tow cable
You must anchor the inner end of the tow cable. If you catch the towfish on the bottom, the inner end anchor will carry the strain on the cable until the safety mechanism on the towfish reacts to free the towfish. It is also possible to foul the towfish so badly that it cannot readily pull free even if the safety mechanism is deployed. In this situation the inner end anchor may save the computer from being pulled into the water. Refer to the situation below concerning the danger of catching the towfish on the bottom.

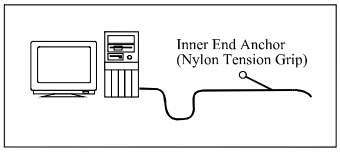

Figure 3-7 Anchor Inner End of Tow Cable

Tow cable on afterdeck
The entire crew should be aware of where the excess cable is deployed on the deck. Whenever the towfish is in the water everyone should remain cautious of the cable.

Communication
It is very important to keep open communication between the side scan computer operator, cable handler and ship's pilot. Everybody's role should be clearly defined before starting the operation. The side scan operator and cable handler must work closely together to maintain the fish at the optimal towing altitude. The side scan operator must also coordinate navigating the ship with the ship's pilot. A survey plan should be decided on between the pilot and the side scan computer operator before getting under way.

All three people must be in close communication when making turns. Turning the boat slows down the towfish, making it drop towards the bottom. This may cause the towfish to hit the bottom. Before starting the survey, the side scan operator, pilot and cable handler should go over the procedures for when the towfish is about to hit the bottom. If the towfish is about to hit the bottom the cable can be pulled in or the ship can speed up. Speeding up the boat increases the drag on the in-water cable, effectively lifting the towfish up. However, this will not work when a depressor is attached to the towfish. In this case, speeding up the boat will push the towfish down, simply increasing the speed at which the towfish will hit the bottom.

Catching the towfish on the bottom
Great care should be exercised to avoid catching the towfish on the bottom. As suggested above, the operator, pilot and cable handler should be prepared to avoid such an incident. If the towfish is caught on the bottom and if the safety mechanism should fail to free the towfish, the tow cable will most likely break from the strain. One is effectively using the tow cable as an anchor chain with the Sea Scan PC towfish as the anchor. If the towfish catches on the bottom and the safety mechanism manages to free it from the bottom, bring the towfish up to the surface, inspect it for damage and replace the shear pin as required.

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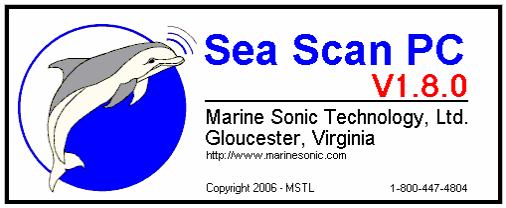
Section 4

- **Sea Scan PC Software**

4 Sea Scan PC Software

4.1 Overview

This chapter describes the operation of the *Sea Scan PC* application. Detailed subsections outlining the various features of the *Sea Scan PC* application follow a brief overview.



Sea Scan PC uses an Intel-based computer with the WindowsÒ operating system for data display and system control. If not started automatically the *Sea Scan PC* application is started from the Windows desktop by double clicking on the*Sea Scan PC* icon.

The *Sea Scan PC* program allows you to control the sonar data collection process, view, analyze and save the sonar image with the related navigational information. The program also features a sophisticated integrated plotter to plot location and estimated swath coverage.

The *Sea Scan PC* may be configured for different operating requirements. These operating and display parameters are saved in an initialization file, *sspc.ini*. The operating and display parameters are displayed graphically in the Sea Scan PC tool bar and the information window.

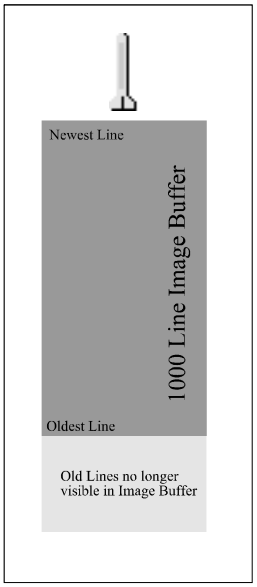


Figure 4-1 Image Buffer

The basic function of the *Sea Scan PC* software is to display the sonar image on the screen. Each time the sonar transducer pings (emits an acoustic pulse) the reflection data is recorded and displayed along a horizontal line on the display screen. As the towfish passes over the seafloor, it is continuously pinging. The seafloor image is built by drawing the reflection data line by line. The reflection data is recorded in a 1000 line image buffer. This means only the latest 1000 lines of the sonar record are viewable. When a new sonar line is recorded it writes over the oldest sonar line. Not all of the 1000 lines in the image buffer can be displayed on the screen at the same time. However, you may review all the lines in the image buffer by scrolling up or down the screen with the scroll bar along the right side of the data window.

The *Sea Scan PC* features an integrated plotter. The Sea Scan plotter allows you to set search patterns and monitor swath coverage while collecting the sonar data. The Sea Scan plotter is working in the background always and may be displayed at anytime. It floats on top of the data window containing the new incoming sonar data. Once a feature is located, the site may be marked on the Sea Scan plotter for future reference. Details of the Sea Scan plotter and the plotter-sonar image interaction are provided in the following chapters.

The *Sea Scan PC* features software controllable gain compensation. The Sea Scan gain control allows you to set the time-gain compensation for the incoming sonar signal. The Sea Scan gain control is always available and may be displayed at anytime. It floats on top of the data window containing the new incoming sonar data. Details of the Sea Scan gain control are provided in the following chapters.

Although each feature is described in detail in the following chapters, the easiest method to learn the

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Sea Scan PC application is to try it. We recommend you try *Sea Scan PC* in Training mode to become familiar with its basic operation and to help learn the many powerful features of the *Sea Scan PC* program.

4.2 Screen Layout

4.2.1 Overview

The *Sea Scan PC* screen may be divided into functional sections: the caption bar; the menu bar; the Sea Scan tool bar; the information window; and finally the data window.

Figure 4-2 Sea Scan PC Screen Layout

The caption bar, along the top of the screen, displays the *Sea Scan PC* title and the current operation mode of the program. The menu bar is directly below the caption bar. The menu items are described in detail in subsequent chapters. The Sea Scan tool bar, along the left side of the screen, consists of a set of controls that allow you to instantly and easily change any of the operating and display settings. The controls in the tool bar also provide a visual cue of the current settings. The data window displays the sonar image. Details for the various image manipulation and control features are provided in the following chapters.

4.2.2 Caption Bar

The caption bar is along the top of the screen. The name of the application and the current operating mode are displayed in the caption bar. In normal operating mode, the application name, *Sea Scan PC v1.6*, is displayed. In *training* mode, ---- *TRAINING* ---- is displayed on either side of the application name. In *automatic dialog response* mode the text *AUTO-DIALOG Response* appears in the title also.

4.2.3 Menu Bar

The menu bar is located directly below the caption bar. It contains the menus for use with the *Sea Scan PC* application.

4.2.3.1 File Menu

The File menu allows you to perform system functions that are not directly related to viewing the sonar image.

Save

This command allows you to save the current image data to disk using the Express Save method. The file is named automatically, based on the default file name, and placed in the default directory. The Express Save method is described in detail in **Express Save** 88.

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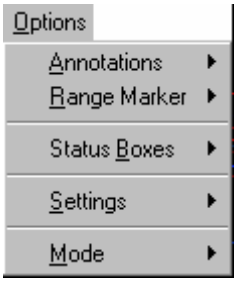
Exit

This command exits the *Sea Scan PC* application and returns you to the Windows desktop.

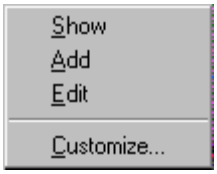
4.2.3.2 Options Menu

The Options menu allows you to perform functions that are related to the operation and monitoring of the *Sea Scan PC* and display and storage of the sonar data.



Annotations

This command displays a pop-up menu of annotation commands. The Annotation process is described in detail in **Annotations** 82.



Annotations - Show

This command toggles the display of the annotation symbols in the sonar image data. When the annotation symbols are displayed, a check mark will appear next to this menu item. To remove the annotation symbols from the sonar image, select this menu item again.

Annotations - Add

This command allows you to add an annotation to the sonar image.

Annotations - Edit

This command allows you to edit the annotations that are present in the sonar image.

Annotation - Customize

This command allows you to customize the annotation Comment Short-Cut buttons.

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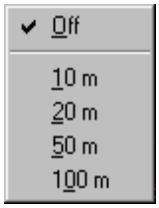
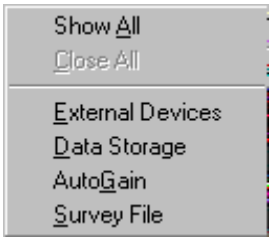
Range Marker



Range markers are also called scale lines since they are scale reference lines displayed in the sonar image. This command displays a list of possible ranges for the range markers. The current range marker setting is indicated with a check mark. Range markers are placed over the sonar image at the designated interval to provide a quick visual cue for range from the towfish. For example, if you have selected 20 meters as the range interval, the range markers will be placed over both channels of the sonar image data every 20 meters. They are displayed in an intermittent format. The range markers are displayed for 30 lines and then skipped for 50 lines. The intermittent display results in a vertical dashed line marking the selected range interval.

Status Boxes



This command displays a pop-up menu that allows you to toggle the display of status boxes. Each status box allows you to monitor a specific task related to the *Sea Scan PC* operation. When a status dialog is visible, a check mark will appear next to the respective menu item. To remove the status dialog, select the menu item again.

Show All

This command allows you to display all the available status boxes.

Close All

This command allows you to close all the status boxes that are currently visible.

External Devices

This command displays a dialog that displays the current status of the external devices. The *External Input/Output Status* dialog is described in detail in **Monitoring External Devices** 140.

Data Storage

This command displays a dialog that displays the current status of the data storage. The *Data Storage Status* dialog is described in detail in **Monitoring Data Storage** 89.

AutoGain

This command displays a dialog that displays the current status of the automatic gain operation. The *AutoGain Status* dialog is described in detail in **Monitoring AutoGain Process** 70.

Survey File

This command displays a dialog that displays the current status of the survey files. The *Survey File Status* dialog is described in detail in **Monitoring Survey File** 93.

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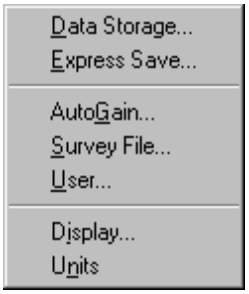
Settings

This command displays a pop-up menu that allows you to set specific settings related to the *Sea Scan PC* operation.



Data Storage

This command displays a dialog that enables you to set the data storage parameters. The automatic save settings, and channel storage resolution may be adjusted depending on the operating preference. The data storage parameters are described in detail in **Data Storage Settings** 88.

Express Save

This command displays a dialog that enables you to override the automatic express save name and directory. The express save parameters are described in detail in **Setting Express Save Settings** 87.

AutoGain

This command displays a dialog that enables you to set the automatic gain parameters. The AutoGain interval and background signal strength may be adjusted depending on the operating preference. The AutoGain parameters are described in detail in **Automatic Gain Settings** 69.

Survey File

This command displays a dialog that enables you to set the items that are to be recorded in the optional survey files. The survey file options are described in detail in **Setting Survey File Settings** 91.

User

This command displays a dialog that enables you to set various user options. The startup and shutdown, automatic and runtime options may be adjusted depending on the operating preference. The user options are described in detail in **User Parameters** 27.

Display

This command displays a dialog that enables you to set the data display parameters. The scroll direction may be set according to the operator's preference. The display parameters are described in detail in **Display Parameters** 29.

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Units

This command displays a dialog that enables you to set the length, speed and location units. A consistent set of units is used throughout the application.

Mode

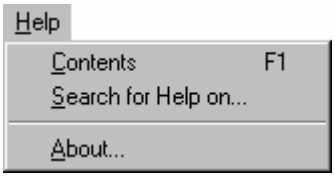
This command allows you to select the operating mode of *the Sea Scan PC*. By default, you will always start the application in active mode, the normal operating mode. However, for training purposes, you may select training mode using this menu item. The current mode is indicated with a check mark. In addition, when in training mode, ---- *TRAINING* ---- is displayed on either side of the application name in the caption bar.

4.2.3.3 External Menu

The External menu lists all the external devices used in the operation of the *Sea Scan PC*. The menu item for each external device displays a pop-up menu. This pop-up menu allows you to either display a dialog to change the device's settings or a dialog to test the serial communications for the specific external device. See **External Devices** 37 for more information about the External menu.

4.2.3.4 Help Menu

The *Help* menu allows you to access the on-line help for the *Sea Scan PC* application and the *About* dialog.



Contents

This command displays the *Contents* page of the *Sea Scan PC* on-line help. This is a good starting page to find general help about the application. This menu item is disabled if the *Sea Scan PC* on-line help does not exist.

Search for Help on...

This command displays the *Search* dialog for the *Sea Scan PC* on-line help. This dialog allows you to search for keywords in the on-line help. This menu item is disabled if the *Sea Scan PC* on-line help does not exist.

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About...

This command displays the *About* dialog for the *Sea Scan PC* application. To remove the *About* dialog, press the OK button.

4.2.4 Information Window

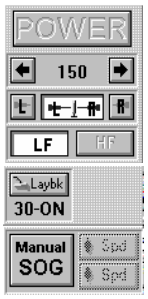
The information window is located directly below the menu bar. It displays the navigational information, such as the latitude and longitude, speed-over-ground and course-over-ground, when it is available. The active color scale is also displayed in the information window.

4.2.5 Sea Scan Tool Bar

The Sea Scan tool bar is located along the left side of the screen, below the menu bar. The Sea Scan tool bar consists of a set of controls that allow you to instantly and easily change any of the operating and display settings. The controls in the Sea Scan tool bar also provide a visual cue of the current settings. The controls are divided into functional groups: Operating Parameters; Display Parameters; File Management; Modules; Annotations; and finally Gain.

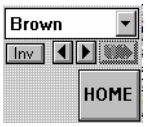
4.2.5.1 Operating Parameters

This group of controls allows you to change the essential operating parameters of the *Sea Scan PC* data collection, such as power mode, range, channel and frequency mode, layback, and the manual speed settings. These operating parameters are described in detail in **4.5 Operating Parameters** (p. 4-14).



4.2.5.2 Display Parameters

This group of controls allows you to change the display parameters of the sonar image data in the data window, such as color scale. These display parameters are described in detail in **Display Parameters** 29.



4.2.5.3 Express Save

The express save control allows you to express save a file. The express save option is described in detail in **Express Save** 88.

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4.2.5.4 Modules

This group of controls provides access to the modules. The display of the Sea Scan plotter, Sea Scan gain control and Sea Scan range delay windows are toggled with the *Plotter*, *Gain* and *Delay* check boxes respectively. The *Zoom*, *Length* and *Height* buttons initiate the zoom, length measurement and object height measurement processes respectively. Each of the modules is described in detail in the following chapters.

4.2.5.5 Gain

These controls allow you to quickly change the gain settings without having to open the gain dialog. You can initiate the automatic gain process and increment or decrement the entire set of gain settings. The gain operation is described in detail in **Gain** 62.

4.2.5.6 Annotations

These controls allow you to quickly change the annotations in the sonar image. You can toggle the display of the annotation symbols in the sonar image, add and edit annotations and monitor the number of annotations present in the current sonar image. Each of these controls is duplicated in the Options menu. The annotation options are described in detail in **Annotations** 82.

4.2.6 Data Window

The data window takes up most of the screen and is located to the right of the Sea Scan tool bar and below the information window. The data window displays the sonar image data. The window is always 512 pixels horizontally, however, depending on the screen resolution, the number of vertical pixels may vary. Typically, not all of the lines in the image buffer can be displayed on the screen at the same time. However, you may view all of the image lines by scrolling up or down with the vertical scroll bar.

4.3 User Parameters

4.3.1 Overview

There are a number of parameters you can set to modify the user interface according to both your level of expertise and your operational requirements.

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4.3.2 Setting User Settings

Select the Settings|User… menu item in the Options menu to set the user settings. The *User Settings* dialog is displayed. The dialog consists of three sections: the Startup and Shutdown Options section; Automatic Operation section; and the Runtime Options section. To enable an option, place the cursor on the corresponding check box, then press and release the left mouse button. A check mark will appear in the check box when the option is enabled. Save the new user settings by clicking the OK button or hitting Return. The new user settings are effective immediately. Alternatively, cancel the new user settings by pressing the Cancel button. Any changes to the original user settings will be ignored.

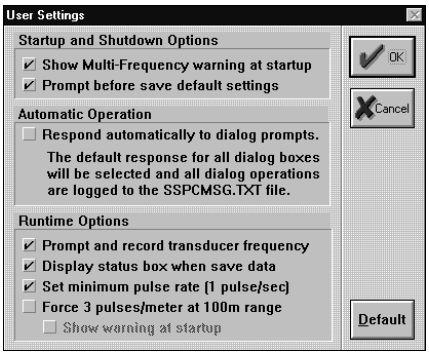
User Settings
Startup and Shutdown Options
Show Multi-Frequency warning at startup
Prompt before save default settings
Automatic Operation
Respond automatically to dialog prompts.
The default response for all dialog boxes will be selected and all dialog operations are logged to the SSPCMSG.TXT file.
Runtime Options
Prompt and record transducer frequency
Display status box when save data
Set minimum pulse rate (1 pulse/sec)
Force 3 pulses/meter at 100m range
Show warning at startup
OK
Cancel
Default

Figure 4-3 User Settings Dialog

4.3.2.1 Startup and Shutdown Options

Show Multi-Frequency warning at startup

This option enables the Multi-frequency warning at startup. Many of the older Sea Scan PC systems are not capable of multi-frequency control. If your interface board is not capable of multi-frequency control a warning can be displayed at start up. This warning indicates that an initial check of your system shows that the current Sea Scan PC interface board is not capable of multiple frequency control. You can still use this version of the Sea Scan PC software, but the frequency selection option will not be available. You can disable this warning so that it will not appear each time you start up the *Sea Scan PC* application.

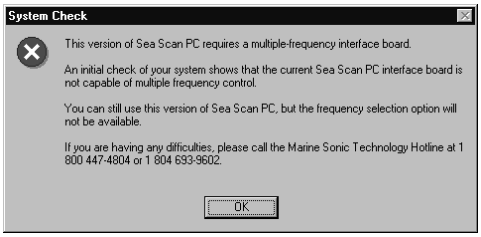
System Check
This version of Sea Scan PC requires a multiple-frequency interface board.
An initial check of your system shows that the current Sea Scan PC interface board is not capable of multiple frequency control.
You can still use this version of Sea Scan PC, but the frequency selection option will not be available.
If you are having any difficulties, please call the Marine Sonic Technology Hotline at 1 800 447-4804 or 1 804 693-9602.
OK

Figure 4-4 Multi-Frequency Warning

Prompt before save default settings

This option displays the *Sea Scan PC - Save Settings* dialog when you shutdown the *Sea Scan PC* application. Disable this option if you want to have the current settings saved automatically. However, when enabled, if any of the settings have changed, you are asked if you would like to save the new settings in the initialization file when you exit the application. A dialog is displayed that lists both the original and new settings. Any settings that have been changed are highlighted in red. You have the options of: saving the current settings in the default initialization file, *sspc.ini*; exiting the application without saving the settings and leaving the settings in *sspc.ini* unchanged; or canceling the command to exit and return to the application. Selecting the Yes button is the only option that will recall the current settings automatically the next time you start the Sea Scan PC application.

Sea Scan PC - Save Settings
Setting Original New
Data Direction: UP DOWN
Color Palette: Gray Brown
Custom Palette: SAME
External Devices: MODIFIED
Speed [knots]: 4.3 4.3
Left/Right Gain: SAME
Units: SAME
Frequency: 300 300
Layback: MODIFIED
Range Delay Mode: = Altitude = Altitude
Range Delay [m]: 0.0m (0) 0.0m (0)
Range [m]: 100-BOTH 20-BOTH
Range Markers [m]: OFF OFF
Automatic Save: OFF - 0 OFF - 0
Resolution: 1000 x 512 1000 x 512
Annotations: SAME
User Options: MODIFIED
Survey File Output: SAME
Plotter: SAME
Do you want to save the NEW DEFAULT SETTINGS?
Yes
No
Cancel

Figure 4-5 Save Settings Dialog

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4.3.2.2 Automatic Options

Respond Automatically to Dialog Prompts

When this option is enabled, the user is never presented with a dialog. The dialogs are never displayed and the default response is automatically selected. All dialog operations are logged to a file, named *sspcmsg.txt*, in the default data directory. If the *sspcmsg.txt* file already exists, any new dialog events are appended at the end of the file. This option is not recommended for normal operations; however, it is essential for use in the Host-Remote mode.

4.3.2.3 Runtime Options

Prompt and record transducer frequency

If this option is enabled you will be prompted to select the transducer frequencies when you turn the power on. This information is for data collection and review purposes only and does not affect the actual frequency of the transducers. If this option is disabled, the transducer frequency will be recorded as *Unknown*. See **Power_Control** 34 for more information about recording the transducer frequencies when the power is turned on.

Display status box when save data

If this option is enabled, the *Data File Save* dialog is displayed when the data is written to disk. The *Data File Save* dialog displays the name and directory of the new data file, the resolution and compression mode, and it contains a thermometer that allows you to monitor the progress of the data storage process. Condensed images of the image buffer, and the current and survey plotters are also displayed for your reference. See **Saving Data** 85 for more information about the *Data File Save* dialog.

Set minimum pulse rate (1 pulse/sec)

If this option is enabled, the minimum pulse rate will be pegged at 1 pulse per second. The *Sea Scan PC* will not be able to ping slower than this minimum limit. This option will ensure that data is still being collected even as the speed-over-ground approaches zero knots.

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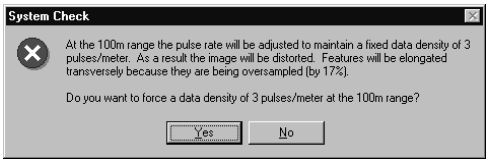
Force 3 pulses/meter at 100m range

NOAA has a requirement that side scan surveys at the 100-meter range must maintain a minimum of 3 pulses per meter (0.33m per pulse). The correct pulse rate at the 100 meter range to maintain the proper 1:1 aspect ratio in the data window is 2.56 pulses per meter (0.39m per pulse). The mandated coverage results in a pulse rate that is slightly faster and will cause the seafloor to be over sampled. The increased pulse rate will distort the sonar data image in the data window by 17%. Features will appear slightly elongated in the transverse axis caused by the oversampling. This option is not recommended for normal operations; however, it may be required for some NOAA surveys.

Show warning at startup

This option enables a warning about the NOAA oversampling requirement at startup. As stated above, the oversampling will slightly elongate features in the data window. You can disable this warning so that it will not appear each time you start up the *Sea Scan PC* application.


System Check
At the 100m range the pulse rate will be adjusted to maintain a fixed data density of 3 pulses/meter. As a result the image will be distorted. Features will be elongated transversely because they are being oversampled (by 17%).
Do you want to force a data density of 3 pulses/meter at the 100m range?
Yes
No
Figure 4-6 NOAA Oversampling Warning

4.4 Display Parameters

4.4.1 Overview

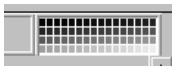
The display parameters only affect the display of the sonar image data in the data window. They do not affect the manner in which the data is collected and processed. Any of the display parameters may be changed at any time during the operation of the *Sea Scan PC* application without affecting the data collection process. Any changes to the display parameters are effective immediately.

4.4.2 Color

4.4.2.1 Overview

For every sample of the acoustic return from the seafloor, the intensity is recorded as a value from 0 to 255 (8 bits). A 0 indicates no return was detected in that particular sample and a value of 255 indicates the maximum intensity was detected. These 256 levels of acoustic intensity are drawn to the screen with a 64-element color scale (6 bits). In other words, the data intensity values between 0 and 255 are converted to display intensity values of 0 to 63. These display intensity values from 0 to 63 are drawn to the screen by the color scale elements 0 to 63 respectively.

The current color scale is displayed in the information window. Having the color scale displayed on the screen allows you to ensure the contrast and brightness of your monitor are set properly.



4.4.2.2 Selecting the Color Scale

The *Sea Scan PC* has a set of predetermined color scales. The color scale you select can have a dramatic effect on your interpretation of the sonar image data since different color scales bring out different features in the sonar record. We recommend you try various color scales for your sonar

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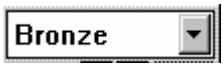
record interpretation, until you are comfortable with one particular color scale.† There is also a user definable custom color scale. With the custom color scale, the operator can define any of the 64 colors.



To select a color scale, select the corresponding item in the color scale pull-down list in the Sea Scan tool bar. The color scale in the information window and anywhere the sonar image data is displayed, such as the data and zoom windows, will change immediately to the newly selected color scale. The name of the selected color scale is displayed in the Sea Scan tool bar.

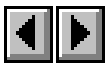
Note: The traditional *Gray* scale is fair for imaging. However, we have found the *Bronze* and *Gold* scales have a larger perceived dynamic range since the eye senses a greater contrast differential between neighboring shades without losing a sense of color continuity.

4.4.2.3 Inverting the Color Scale

Any of the color scales may be inverted such that the high intensity returns become dark and the low intensity returns become light. This is the display setting for traditional sonar systems since they wrote black ink for acoustic returns on light brownish paper. The higher the intensity of the acoustic return, the more black ink was used. The dark ink on light paper process necessitated the reversal in natural intensity visualization on the part of the sonar operator. In normal mode, as opposed to the inverted mode, any high intensity returns are brighter than the darker background. This provides a view of the seafloor analogous to illuminating the seafloor with light and viewing from above. Objects appear brighter than the background and shadows are black. In inverted mode objects are darker than the background and shadows are white.

To invert the currently selected color scale, select the *Invert Color Scale* check box in the Sea Scan tool bar. The color scale in the information window and anywhere the sonar image data is displayed, such as the data and zoom windows, will change immediately to the inverted color scale. When the current color scale is inverted, the *Invert Color Scale* check box will appear pressed. Similarly, when the current color scale is not inverted, the check box will appear raised.

4.4.2.4 Cycling Color Scales



The color scales are organized in a list. This list is displayed, as a standard pull-down list, when you select the down arrow next to the color scale name. There are left and right arrow buttons below the color scale name. The left and right arrow buttons allow you to cycle through the color scale list. Select the left arrow to change the color scale to the previous color scale in the list. Similarly, select the right arrow to change the color scale to the next color scale in the list. The color scale in the information window and anywhere the sonar image data is displayed, such as the data and zoom windows, will change immediately to the newly selected color scale. The name of the selected color scale will be displayed in the Sea Scan tool bar.

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4.4.2.5 Setting Custom Color Scale

Click the *Edit Custom Color Scale* button in the Sea Scan tool bar to edit the custom color scale. This button is enabled when the custom scale is the currently selected color scale. The *Sea Scan PC - Custom Color Scale* dialog will appear. All of the 64 colors may be edited.

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1 .Select a base scale to change the entire custom color scale to the corresponding predetermined color scale. This list allows you to easily modify one of the predetermined color scales or to use one of these color scales simply as a starting point.

2. Select one of *the Scale Modification* buttons to perform a transformation on the entire color scale. The *Brighten* and *Darken* buttons increase and decrease the color intensities by 5% respectively. The *Invert* button inverts the entire color scale.

3. Click on a color square in the *Custom Color Scale* group. The selection marker, a dark box around the color square, indicates the selected color. The original color is displayed on the left side in the *Selected Color* group. In addition, the corresponding RGB (Red, Green, and Blue) values are displayed in the appropriate RGB edit text boxes.

4. Change the red component value by entering a valid number from 0 to 255 in the corresponding edit text box. Any number greater than 255 will be reset to 255 automatically. Any invalid entry, such as alphanumeric text or blanks, will not be allowed and the component value will not be updated. The color square in the *Custom Color Scale* group and the color square displayed on the right side of the *Selected Color* group are updated to reflect the new RGB component values. Likewise, editing the number in the green and blue edit text boxes changes the green and blue component values respectively.

5. Reset the entire custom color scale to its original settings by pressing the *Reset* button. Any changes to the RGB component values for all of the 64 colors in the custom color scale will be cleared. The original custom color scale will be redisplayed in the *Custom Color Scale* group.

6. Save the new custom color scale setting by clicking the OK button. The new custom color scale setting is recorded and the *Sea Scan PC - Custom Color Scale* dialog is cleared from the screen. The color scale in the information window and anywhere the sonar image data is displayed will change immediately to the newly defined custom color scale.

   Cancel the new custom color scale setting by clicking the Cancel button. The new custom color scale setting is not recorded and the *Sea Scan PC - Custom Color Scale* dialog is cleared from the screen.

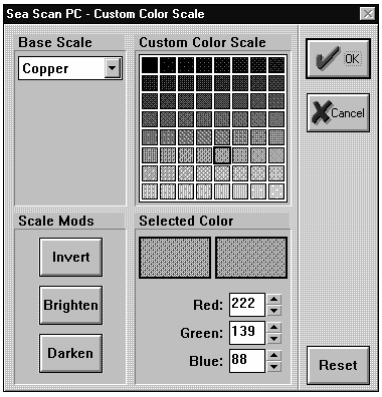

Figure 4-7 Custom Color Scale Dialog

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4.4.3 Data Direction

The sonar image data may scroll up or down the screen. To set the data direction, select the Display… menu item from the Options|Settings pop-up menu. The *Display Settings* dialog will appear. Select the desired scroll direction. *Scroll Data Down* will cause the data to cascade down from the top. The left channel will appear on the left of the screen. Alternatively, *Scroll Data Up* will cause the data to scroll up from the bottom. The left channel will appear on the right of the screen. Save the new scroll direction by clicking the OK button. The new scroll direction is recorded and the *Display Settings* dialog is cleared from the screen. The *Sea Scan PC* will regenerate the existing sonar image data for the new perspective in the data window. If the image has been scrolled, the scroll position will be maintained after the sonar image data has been regenerated. The channel mode buttons will reflect the data scroll direction.

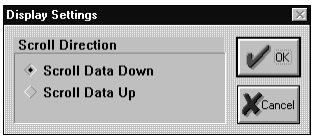

Figure 4-8 Display Settings Dialog

4.4.4 Scrolling

4.4.4.1 Overview

As described in figure 4-1 in the **Sea Scan PC Software Overview** 19, the active sonar image is maintained in an image buffer. The screen cannot display all the lines of the image buffer at once. When the sonar image scrolls off the top or bottom of the screen, depending on the data direction, it has not disappeared. It has simply scrolled past the currently visible portion of the data window. Using the vertical scroll bar along the right side of the data window, you may scroll the sonar image “up” or “down” to view sections that have scrolled past the currently visible portion. You cannot scroll beyond the top or bottom of the image buffer. Data is still collected and written to the image buffer. If the data window has been scrolled, the new data will not be visible until the data has scrolled up to the visible portion of the data window. When a sonar line scrolls past the end of the image buffer it has disappeared unless, of course, the data has been saved to disk.

4.4.4.2 "Home" State

“Home” state indicates that the newest sonar line is immediately visible on the screen. When you scroll, the newest sonar line is no longer immediately visible on the screen. The data window is no longer in the “Home” state. The *Home* button in the Sea Scan tool bar will flash to indicate that the data window is not in the “Home” state. Once you have scrolled back to the “Home” state, the *Home* button in the Sea Scan tool bar no longer flashes. The quickest method to return the data window to the “Home” state, such that the newest sonar line is immediately visible on the screen, is by pressing the *Home* button in the Sea Scan tool bar.

4.4.4.3 Scroll Bar

The vertical scroll bar for the data window consists of three components. The up and down arrows are at the top and bottom of the scroll bar. The scroll thumb, in the middle, indicates the position of the current visible portion of the data window relative to the top and bottom of the image buffer.

To scroll up one line, press the up arrow at the top of the scroll bar once. The visible portion of the data window will scroll up the image buffer by one line. To scroll up a significant number of lines at a time, press the space between the scroll thumb and the up arrow. You cannot scroll above the top of the data window. To scroll up continuously, hold the up arrow down. Alternatively, select the scroll thumb and while keeping the mouse button pressed, move the scroll thumb up. The position of the scroll thumb relative to the top and bottom of the scroll bar will set the position of the visible portion of the data window.

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To scroll down one line, press the down arrow at the bottom of the scroll bar once. The visible portion of the data window will scroll down the image buffer by one line. To scroll down a significant number of lines at a time, press the space between the scroll thumb and the down arrow. You cannot scroll below the bottom of the data window. To scroll down continuously, hold the down arrow down. Alternatively, select the scroll thumb and while keeping the mouse button pressed, move the scroll thumb down. The position of the scroll thumb relative to the top and bottom of the scroll bar will set the position of the visible portion of the data window.

4.4.5 Units

A consistent set of units for length, speed and location are used throughout the entire *Sea Scan PC* application. To set the units, select the Units… menu item from the Options|Settings pop-up menu. The *Units* dialog will appear.

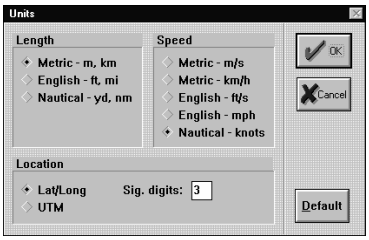

Figure 4-9 Units Settings Dialog

Select the desired units for both the length and speed measurements and the display of location information. The length units are used for all length and distance measurements, such as those found in the *Height* and *Rng/Bearing* dialogs. The appropriate dimension, either meters or kilometers for metric units, feet or miles for english units, and yards or nautical miles for nautical units, is used to display the length. The speed units are used for the Speed-Over-Ground display. The location units are used to display the location information. In Lat/Long mode, the number of significant digits for the minutes can be set. The conversion from latitude and longitude to UTM coordinates is based on the equations from *USGS Bulletin 1532* using the WGS-84 model.

Save the new units selection by clicking the *OK* button. The new units are recorded and the *Units* dialog is cleared from the screen. The *Sea Scan PC* will redisplay all length, speed and location information using the new units.

4.5 Operating Parameters

4.5.1 Overview

The operating parameters affect the manner in which the data is collected and processed. Any of the operating parameters may be changed at any time during the operation of the *Sea Scan PC*. Any changes to the operating parameters are effective immediately.

4.5.2 Power Control

4.5.2.1 Turning Power On

Turn the power on and start the data collection process by selecting the *Power* button in the Sea Scan tool bar. The *Power* button will appear pressed down and backlight with the color red. Power will be supplied to the transducers immediately. The transducers ping (emit the acoustic pulse) and then the incoming reflection data is recorded and displayed in the data window.

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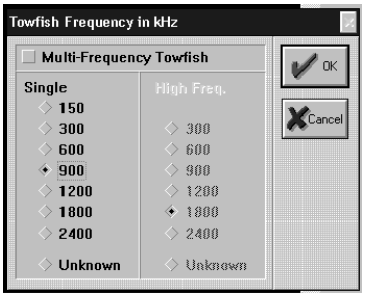

Figure 4-10 Towfish Frequency Dialog

When you turn the power on, you are prompted to select the transducer frequency. If you are using a multiple frequency system with multi-frequency transducers you will be able to select both the low and high frequencies. **This information is only for data collection and review purposes and does not affect the actual frequency of the transducers.** You must select the proper frequency for the recorded information to be valid. If the user option to record the frequency has been disabled, the frequency will be recorded as "Unknown."

4.5.2.2 Turning Power Off

Turn the power off and stop the data collection process by selecting the *Power* button in the Sea Scan tool bar again. The *Power* button will appear raised. Power will no longer be supplied to the transducers and they will no longer ping.

4.5.3 Range

4.5.3.1 Overview

The *Range Settings* group in the Sea Scan tool bar consists of the current range and left and right arrows to decrement and increment the range.

The range is the distance from the transducer that the *Sea Scan PC* will display for both channels. Thus, when the range is set to 50 meters, the *Sea Scan PC* is set to "look" 50 meters on either side of the two transducers. Depending on the operating requirements you may want to set the *Sea Scan PC* to different ranges. The shorter ranges allow very high resolution imaging at close ranges with a high frequency transducer. The long ranges may be used with the 150 kHz sonar transducer to cover large areas while in a search pattern.

If a range delay has been set, then *-RD* will appear after the range in the *Range Settings* group. This provides a quick reference for you to see if a range delay is in use. See **Range Delay** 74 for more information on the use of range delay.

4.5.3.2 Setting Range

Increment the selected range by pressing the right arrow button in the *Range Settings* group in the Sea Scan tool bar. For example, the range will be increased from 75 to 100 meters when the right arrow button is pressed once.

Decrement the selected range by pressing the left arrow button in the *Range Settings* group in the Sea Scan tool bar. For example, the range will be decreased from 75 to 50 meters when the left arrow button is pressed once.

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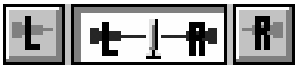
4.5.4 Channel Mode

4.5.4.1 Overview



The *Channel Mode* group in the Sea Scan tool bar consists of a button for the left channel mode, both channel mode and one for the right channel mode. Only one of the channel mode buttons may be selected at one time. The channel mode button for the currently active channel mode will appear pressed down and backlight with the color white. The images in the channel mode buttons reflect the data scroll direction. In "data down" direction, the left and right channels are on the left and right sides respectively. In "data up" direction, the left and right channels are on the right and left sides respectively. The button images change to reflect the current data scroll direction.

You may set the *Sea Scan PC* to display either the left channel only, the right channel only or both the left and right channels simultaneously. Depending on the operating requirements you may want to view both channels at standard axial resolution or only one of the channels at double the axial resolution. When viewing only one of the channels you have twice as many horizontal pixels on the screen with which to view the sonar image data. Thus, for any given range, twice the axial resolution may be displayed on the screen since you are displaying only one instead of two channels.

4.5.4.2 Setting Channel Mode

To set the channel mode, press one of the buttons in the *Channel Mode* group in the Sea Scan tool bar. For example, to view only data on the left side, press the *Left Channel* button. The selected button will appear pressed down and backlight by the color white.

4.5.5 Frequency Mode

4.5.5.1 Overview

The *Frequency Mode* group in the Sea Scan tool bar consists of a button for the low frequency mode and one for the high frequency mode. Only one of the frequency mode buttons may be selected at one time. The button for the currently active frequency mode will appear pressed down and backlight with the color white.

Depending on the operating requirements you may want to use either the low or high frequency transducers. The low frequency transducers, although providing a lower axial resolution, will "see" further than the high frequency transducers. Likewise, although not able to "see" as far, the high frequency transducers will provide very high resolution imaging capability at closer ranges.

4.5.5.2 Setting Frequency Mode

To set the frequency mode, press one of the buttons in the *Frequency Mode* group in the Sea Scan tool bar. For example, to use the high frequency transducers, press the *High Frequency* button. The selected button will appear pressed down and backlight by the color white.

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4.5.6 Speed Control

4.5.6.1 Overview

The *Sea Scan PC* maintains a constant 1:1 aspect ratio for the sonar image. This is possible by setting the ping rate based on the current range and the speed-over-ground (SOG). The spacing of each vertical line on the screen is equivalent to a known distance for each of the ranges. The *Sea Scan PC* sets the transducers to ping at these interval distances so the resulting image has a 1:1 aspect ratio. The time between each of these known distance intervals is dependent on the speed of the vessel over the ground. The time interval is set based on the *Sea Scan PC*'s "apparent speed." The "apparent speed" is the speed the *Sea Scan PC* thinks the vessel is traveling.

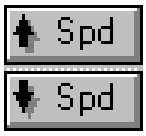
4.5.6.2 Automatic Speed Control

Using an accurate estimate of the vessel's SOG we can determine the time interval required between each ping event. An externally supplied SOG is used to set the *Sea Scan PC*'s internal "apparent speed" automatically.

4.5.6.3 Manual Speed Control

When the SOG information is not available externally, you may manually match the "apparent speed" to the vessel's actual speed-over-ground to maintain the constant 1:1 aspect ratio for the image.

If not already turned on, press the *Manual SOG* check box in the Sea Scan tool bar. The button will appear pressed down and backlight with the color red. This places the *Sea Scan PC* in manual speed control mode. The *Sea Scan PC* will no longer look for the SOG from the external navigational source. You may now manually control the "apparent speed" and subsequently the ping rate.



Press the *Speed Up* and *Speed Down* buttons to increase and decrease the "apparent speed" by 0.1-knot steps. You do not need to press the button for each 0.1-knot change in the speed. By simply keeping the either of the *Speed* buttons pressed down, the "apparent speed" will continue to increase or decrease until you release the button.

The new "apparent speed" is written in the information window. The ping rate is changed immediately. Decreasing the "apparent speed" less than the true speed results in under-sampling the seafloor and compressing features in the transverse axis. The transducers do not ping often enough to maintain the 1:1 aspect ratio. Similarly, increasing the "apparent speed" greater that the true speed results in over-sampling the seafloor and elongating features in the transverse axis. The transducers ping too often to maintain the 1:1 aspect ratio. Over-sampling is useful in some instances, such as when setting the gain controls. In this case, having the Sea Scan PC data scroll as fast as possible allows you to better monitor the effect on the sonar image as the gain controls are changed.

4.6 External Devices

The external devices are described in detail in a separate section of the manual. For more information on the external device, please refer to **External Devices** 140.

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4.7 Plotter

4.7.1 Overview

This chapter describes the features of the integrated Sea Scan plotter. If the *Sea Scan PC* is receiving navigational information from an external source, the vessel's latitude and longitude position (L/L) are plotted on the current and survey plotters. The Sea Scan plotter can plot the vessel's position worldwide. If the vessel's heading or course-over-ground (COG) is also available, the estimated swath coverage of the sonar beam may also be plotted with the vessel's track. Position markers may be set in the plotters to mark navigation waypoints, seafloor features, or survey routes. The Sea Scan plotter is a separate module that works in the background continuously logging and plotting track position and swath coverage. Although it is separate, the Sea Scan plotter interacts very closely with the data collection and sonar image presentation. Any section of the sonar image may be directly correlated to its position on the Sea Scan plotter. This allows unprecedented real-time site location from sonar images. Seafloor features may be marked on the Sea Scan plotter by simply "clicking" the feature on the sonar image.

The complete Sea Scan plotter-sonar image interaction is detailed later in this chapter. The *Plotter* button in the Sea Scan tool bar toggles the Sea Scan plotter on and off the screen. When the Sea Scan plotter is visible it floats on top of the data window containing the new incoming sonar data. Although the Sea Scan plotter cannot be resized, it can be moved anywhere on the screen.

4.7.2 Plotter Layout

The Sea Scan plotter window is a standard window. Apart from the caption bar, it consists of four sections: the display window; the information window; the status window; and the plotter tool bar along the left side.

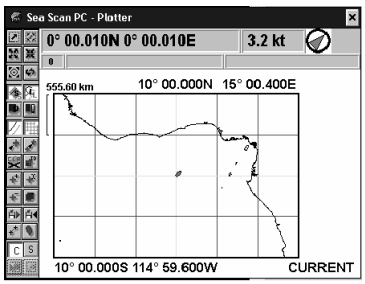

Figure 4-11 Plotter Layout

4.7.2.1 Plotter Display Window

The plotter display window displays either the current or survey plotter grid. Both the current and survey plotters are displayed in the single display window. You may toggle between the two plotters using the *Current* and *Survey* buttons in the plotter tool bar. The active plotter is indicated in the lower right corner of the display window.

The lower-left (southwest) corner and a longitudinal range define the plotter coordinate boundary. The coordinates for the lower-left (southwest) and upper-right (northeast) corners are written at their respective corners. A grid covers the plotter. The grid is set to real-world grid lines that line up at significant latitude and longitude values. A maximum of five grid lines are drawn in either direction. Changing the plotter coordinate boundary will change the location and maybe the number of grid lines on the plotter. However, the grid lines will always be in the proper locations and drawn with representative colors. The equator (0° N), North Pole (90° N), South Pole (90° S), International Date Line (180° E), and the Prime Meridian (0° E) are drawn in yellow. All other degree grid lines are drawn in red, minute grid lines in green, and decimal minutes (including tenths of minutes) in blue. This allows a grid of any dimension to be easily represented without having to draw too many lines.

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The distance between grid lines is displayed in the upper-left corner of the display window. The distance for this grid line spacing is marked along the upper-left edge of the display window.

4.7.2.2 Plotter Information Window

The plotter information window displays the current location (L/L or UTM), speed-over-ground (SOG) and course-over-ground (COG). These are the same values as those displayed in the information window above the data window. However, the COG is displayed graphically, as a ship pointing the direction within a compass rosette, instead of numerically. For the COG indicator, north is up.

4.7.2.3 Plotter Status Window

The plotter status window primarily displays information about the markers and waypoints. The number of markers and waypoints in the plotter is always displayed on the left side of the status window.

Typically, the status window will display information about the most recently selected marker or waypoint. This feature is useful for determining exact marker locations and quickly identifying different markers on the plotter. To display information about a marker or waypoint in the status window move the arrow cursor to a position in the display window close to the marker or waypoint you would like to select. Then press and release the left mouse button. The location and identifier string of the marker or waypoint closest to the cursor are written to the Status window.

The status window is also used to display plotter action information. In situations where you must perform an action after selecting a button from the plotter tool bar, the required action is indicated in the status window. For example, upon selecting the *Pan* button in the plotter tool bar, the word “Pan” is written in the status window until you have selected a new center position in the display window.

You can measure distance, as range and bearing, between two points on the plotter. This process is described later in this chapter. The range and bearing for the distance measurement are displayed in the status window.

The most recent information remains in the status window until either another marker is selected or another action that makes use of the status window is selected. Alternatively, the status window may be cleared at any time by clicking in the window. However, the number of markers and waypoints in the plotter is always displayed.

4.7.2.4 Plotter Tool Bar

The plotter tool bar is located along the left side of the plotter window. The plotter tool bar consists of a set of controls that allow you to instantly and easily access any of the plotter actions to change the various plotter parameters. You can also quickly modify the display parameters. The plotter tool bar controls may be divided into functional groups: boundary coordinates; display parameters; markers and waypoints; plotter operations; active plotter selection; and finally survey plotter operations.

4.7.3 Setting Boundary Coordinates

The Sea Scan plotter can plot the ship’s position worldwide. The lower-left (southwest) corner and a longitudinal range define the plotter coordinate boundary. The coordinates for the lower-left (southwest) and upper-right (northeast) corners are written at their respective corners in the display

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window.

When the active plotter boundary coordinates are changed, the track points must be redrawn. The track points are stored in a limited buffer and continuously updated as new navigational information is received. Only the track points contained in the buffer can be drawn using the new boundary coordinates. If the survey plotter is active, any action that changes the boundary coordinates may result in losing some recorded navigation information. The survey plotter records all the navigational information that has occurred as an image. As long as the boundary coordinates are not changed it can display the estimated swath coverage for an entire survey. However, if the boundary coordinates are changed it will not be able to redraw the estimated swath coverage for the track points that are no longer stored in the limited buffer. Thus, any action that changes the boundary coordinates and may result in losing some recorded navigation information for the survey plotter must be verified. There are a variety of methods to change the coordinate boundary.

Please note that any new boundary coordinates will not been saved automatically in the initialization file, *sspc.ini*. To store the new settings to disk, you must save them when prompted upon exiting the *Sea Scan PC* program.

4.7.3.1 Manual Configuration

Select the *Manual Configuration* button in the plotter tool bar to configure the active plotter boundary coordinates. The *Plotter Manual Configuration* dialog is displayed.

1. Enter the location of the lower-left (southwest) coordinate by entering either the the latitude and longitude or UTM values in the appropriate text boxes. For the Lat/Long mode, the operator sets the hemisphere by clicking the appropriate button. The current setting is indicated by the state of the two buttons. For example, if the northern hemisphere is selected, the *North* button will appear pressed down and backlight by the color white.

2. Enter the longitudinal range by entering either the degrees, minutes and decimal minutes values in Lat/Long mode or range in meters in UTM mode in the appropriate text boxes.

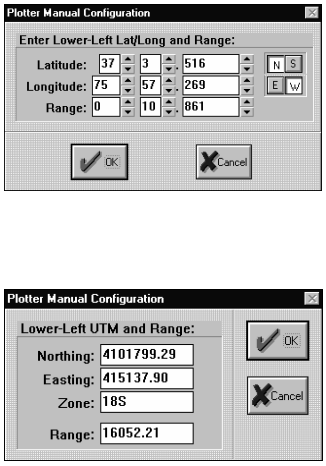

Figure 4-12 Plotter Manual Configuration Dialogs

3. Save the new plotter boundary coordinates by clicking the *OK* button. If any of the entries are invalid, you will be alerted and remain in the *Plotter Manual Configuration* dialog. You will not be able to exit by clicking the OK button unless all the entries are valid. If all the entries are valid, the active plotter is set to the new boundary coordinates and you are returned to the Sea Scan plotter.

   Cancel the new plotter boundary coordinates by clicking the *Cancel* button. The active plotter is not set to the new boundary coordinates and you returned to the Sea Scan plotter.

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4.7.3.2 Automatic Configuration

Select the *Automatic Configuration* button in the plotter tool bar to configure the active plotter boundary coordinates automatically. The track points are centered in newly calculated boundary coordinates.

Hold the **Control** key and select the *Automatic Configuration* button to center the track points and any markers and waypoints. This process works in exactly the same as the normal automatic configuration process, however, all the markers and waypoints are included. The newly calculated boundary coordinates automatically center the track points as well as all the markers.

Hold the **Shift** key and select the *Automatic Configuration* button to automatically synchronize the boundary coordinates of the current and survey plotters. If the current plotter is displayed the boundary coordinates for the survey plotter are transferred to the current plotter. Similarly, if the survey plotter is displayed, the boundary coordinates for the current plotter are transferred to the survey plotter.

4.7.3.3 Zoom In

Select the *Zoom In* button in the plotter tool bar to zoom in on any section of the active plotter. There are two methods for selecting a section of the plotter. You can either select a section with default magnification factor (x2) or you can select a section with any dimensions and a resulting custom magnification factor.

1. Select the *Zoom In* button in the plotter tool bar to select a section of the plotter to zoom. The cursor will change to the "plotter zoom selection" cursor and *Zoom In* will appear in the status window.

2. To zoom in with a default magnification factor (x2), center the "plotter zoom selection" cursor over the section you would like to zoom in on. Then press and release the left mouse button without moving the cursor. The active plotter boundary coordinates are reset to center the selected area but at twice the current magnification factor.

3. Alternatively, you may select a section of any dimension to be zoomed. Place the cursor on one corner of the section you would like to zoom in on. Press the left mouse button and, keeping the left mouse button pressed down, move the mouse to the opposite corner of the selection. A black box will be drawn as you move the mouse indicating the selection.

   The resulting selection must be the same aspect ratio as the plotter display window. If you have made a selection that does not fit the display window properly, the selection will be reoriented. The horizontal or vertical dimension, whichever is larger, is maintained and the selection is centered in the other dimension. Using this method, you can zoom in on any section of the active plotter and are not restricted to x2 magnification factors.

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4. The selected section is displayed in the display window at the new magnification factor and the status window is cleared of the *Zoom In* message.

4.7.3.4 Zoom Out

Select the *Zoom Out* button in the plotter tool bar to zoom out the active plotter. The plotter extents are increased in all directions automatically by a factor of two. Thus, the current plotter is centered in the new plotter boundary coordinates.

4.7.3.5 Pan

Select the *Pan* button in the plotter tool bar to pan the active plotter. In this case the plotter dimensions are not changed, however the plotter may be shifted in any direction.

1. Select the *Pan* button in the plotter tool bar to select a new center for the active plotter. The cursor will change to the "plotter pan" cursor and *Pan* will appear in the status window.
2. Center the "plotter pan" cursor over the section you would like to set as the new center of the active plotter. Then press and release the left mouse button without moving the cursor. The active plotter boundary coordinates are reset to center the selected area without changing the plotter dimensions.
3. The selected section is displayed in the display window and the status window is cleared of the *Pan* message.

4.7.3.6 Cycle Back

Whenever you change the active plotter's boundary coordinates either by zooming in or out and panning, the previous boundary coordinates are recorded. The latest ten boundary coordinates are recorded. Select the *Cycle Back* button in the plotter tool bar to reset to the previous plotter boundary coordinates. You can "cycle back" to any set of recorded boundary coordinates. This is very useful for getting back to a boundary coordinates setting after multiple zooms and pans.

4.7.4 Display Parameters

The Sea Scan plotter's essential function is to display the navigational information. It can enhance this information in three manners: by displaying the estimated swath coverage based on the location, heading or COG and range; connecting the locations with lines; and displaying the depth information as recorded by the external fathometer.

Please note that any new display parameters will not been saved automatically in the initialization file, *sspc.ini*. To store the new parameters to disk, you must either save them as described later in this section with the *Save Settings* button in the plotter toolbar or save them when prompted upon exiting the *Sea Scan PC* program.

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4.7.4.1 Draw Swath

Select the *Draw Swath* check box to draw the estimated swath coverage on the plotter. When selected the check box will appear pressed down and backlight with the color white. This is an estimated swath coverage based on the range and the vessel's location and heading as provided by the external navigational source. If either the location or the heading is not available from the external navigational source, the estimated swath coverage cannot be calculated and thus is not drawn on the plotter.

4.7.4.2 Draw Lines

Select the *Draw Lines* check box to draw the position fixes as connected points. When selected the check box will appear pressed down and backlight with the color white. Otherwise, the check box will appear raised and the vessel's position fixes will appear as separate points.

4.7.4.3 Draw Depth

Select the *Draw Depth* check box to draw the estimated swath coverage and position fixes using a color scale related to the depth. When selected the check box will appear pressed down and backlight with the color white. Otherwise, the check box will appear raised and the estimated swath coverage and position fixes will appear in default colors.

4.7.4.4 Set Depth Color Scale

Select the *Depth Color Scale* button to set the maximum depth extent for the depth color scale. The depth is graphically represented at each position on the plotter by displaying the estimated swath coverage and position fixes with the color related to the depth. The *Depth Scale Settings* dialog is displayed.

1. Enter the maximum depth extent in the current units for the plotter depth display. The depth color scale will be spread from the surface to this maximum depth extent.

2. Save the new maximum depth extent by clicking the *OK* button. If the value is invalid, you will be alerted and you will remain in the *Depth Scale Settings* dialog. You will not be able to exit by clicking the *OK* button unless the entry is valid. If the entry is valid, the depth scale is adjusted to the new maximum depth and the estimated swath coverage is redrawn on the Sea Scan plotter.

   Cancel the new maximum depth extent by clicking the *Cancel* button. The depth scale is not adjusted and you are returned to the Sea Scan plotter.

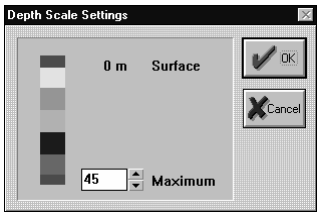

Figure 4-13 Depth Scale Settings Dialog

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4.7.4.5 Draw Shoreline

Select the *Draw Shoreline* check box to draw the shoreline on the plotter. When selected the check box will appear pressed down and backlight with the color white. The shoreline is generated from the *World Vector Shoreline* data file, *wvsfull.dat*, provided by the National Geophysical Data Center of NOAA. *Wvsfull.dat* is a digital data file containing the worldwide shoreline at a nominal scale of 1:200000. The *wvsfull.dat* data file must be present in the same directory as the *Sea Scan PC* executable for this option to be available. If the *Sea Scan PC* application is unable to locate the *wvsfull.dat* data file, the *Draw Shoreline* check box is disabled and grayed out.

4.7.4.6 Draw Grid

Select the *Draw Grid* check box to draw the latitude and longitude grid lines on the plotter. When selected the check box will appear pressed down and backlight with the color white.

4.7.5 Markers and Waypoints

4.7.5.1 Overview

Markers and waypoints may be placed on the plotter to mark a location. Markers and waypoints are placed on both the current and survey plotters. These indicators are useful to mark navigational positions (waypoints) for a survey route, and identified sites (markers). There is one type of waypoint, which is drawn as a green cross on the plotter. There are two types of markers, an estimated marker and a nadir marker. The first marker type (estimated marker), which is drawn as a red square, indicates an estimated position location along a swath. The second marker type (nadir marker), which is drawn as a purple square, indicates the vessel's location only. The distinction between the two markers is related to the calculation used to determine their location. The two marker types, estimated and nadir, are described in greater detail in **Calculating_Position_for_Marker** 56. A location and an identifier string designate each marker. The identifier string may be modified at any time.

Waypoints may be added in three manners:

- **graphically**, by indicating a location in the plotter with the cursor,
- **numerically**, by setting a location,
- **reading** a waypoint file from disk.

Markers may be added in two manners:

- **graphically**, by selecting a feature in the sonar image,
- **reading** a waypoint file from disk.

Although waypoints and markers have the same functional capabilities, they may be treated completely separately. The waypoint buttons in the plotter tool bar only affect the waypoints in the plotter. Similarly, the marker buttons in the plotter tool bar only affect the markers in the plotter.

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4.7.5.2 Selecting a Marker or Waypoint

The status window will display information about the most recently selected marker or waypoint. This feature is useful for determining exact marker locations and quickly identifying different markers on the plotter. To identify a marker or waypoint in the status window move the arrow cursor to a position in the display window close to the marker or waypoint you would like to select. Then press and release the left mouse button. The location and identifier string of the marker or waypoint closest to the cursor are written to the status window. The most recent information remains in the status window until another marker is selected or another action that makes use of the status window is selected. Alternatively, the status window may be cleared at any time by clicking in the window.

4.7.5.3 Range/Bearing

Any of the markers or waypoints may be selected as a navigational marker that is used as a steering reference. The range, bearing and estimated time en route from the vessel's current position to the selected marker are displayed in the *Rng/Bearing* dialog. The *Rng/Bearing* dialog floats on top of the Sea Scan plotter and the data window. It can be moved anywhere on the screen and remains visible even if the Sea Scan plotter is hidden.

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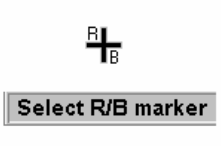
Selecting a Range/Bearing Marker

1. Select the *Range/Bearing Marker* check box in the plotter tool bar. The cursor will change to the "range/bearing marker selection" cursor and the message *Select R/B marker* will appear in the status window.



2. Place the cursor close to the desired marker or waypoint, then press and release the left mouse button.

3. The closest marker or waypoint is selected as the range/bearing marker. A dark blue box is drawn around the selected marker. If there are many markers and waypoints close together you may want to zoom in on the group in order to select the correct marker or waypoint without any problems. The *Rng/Bearing* dialog is displayed, the status window is cleared of the *Select R/B marker* message and you are returned to the Sea Scan plotter. The *Range/Bearing Marker* check box will appear pressed down and backlight with the color white indicating that a marker has been selected for range/bearing navigation information.

Range/Bearing Dialog Layout

Apart from the caption bar, the *Rng/Bearing* dialog consists of three sections: the Bearing and COG display; the Range, Bearing and Estimated-Time-En route (ETE); and the Marker Identification.

The current COG, as determined by the external navigational source, is displayed graphically as a ship pointing the direction within a compass rosette. The ship is gray if true COG is used. Otherwise, it is dark blue if magnetic COG is in use for display purposes. For the COG indicator, north is up. This is the same representation of the COG used in the plotter information window. However, in this case, the bearing to the range/bearing marker is also indicated. A thick red mark on the compass rosette marks the relative position of the range/bearing marker. This provides a visual cue of the relative heading and absolute bearing to the range/bearing marker. The pilot can easily determine the required direction to steer to get to the range/bearing marker. The bearing and COG are updated every time new information is available from the external navigational source.

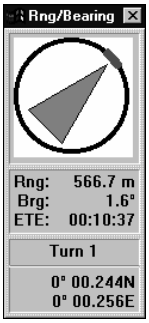


Figure 4-14
Range/Bearing Dialog

The range from the vessel's current position, as determined by the external navigational source, to the range/bearing marker is displayed in the current units below the COG indicator. The range is updated every time new information is available from the external navigational source.

The estimated-time-en route (ETE) from the vessel's current position to the range/bearing marker is displayed in hh:mm:ss format below the range. The ETE calculation is based on the current range and speed-over-ground. The ETE is updated every time new range and SOG information is updated.

The range/bearing marker is identified below the ETE. The location and the identifier string are

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displayed. If the identifier string of the range/bearing marker is changed, using the *Marker/Waypoint Rename* button, the identifier string in the *Rng/Bearing* dialog is updated as well.

4.7.5.4 Track Survey

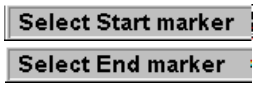
The track survey option is an extension of the *Rng/Bearing* dialog. All the information available in the *Rng/Bearing* dialog is also available in the *Track Survey* dialog with some notable enhancements. A set of waypoints may be selected in sequence to guide you through a survey. For each leg of the survey two waypoints are selected as the start and end points. A line is drawn between the two waypoints and the end marker is used as a reference with which to steer to. The cross-track error (XTE) is displayed numerically and graphically. You can set the XTE range and an arrival alarm radius. When the vessel is within the arrival radius you are prompted to select another end waypoint. The previous end waypoint is automatically updated to the new start waypoint for the next leg. The *Track Survey* dialog floats on top of the Sea Scan plotter and the data window. It can be moved anywhere on the screen and remains visible even if the Sea Scan plotter is hidden.

Initiating First Leg in Survey

1. Select the *Track Survey* check box in the plotter tool bar. The cursor will change to the "track survey selection" cursor and the message *Select Start marker* will appear in the status window.

2. Place the cursor close to the desired start waypoint, then press and release the left mouse button.

3. The closest marker or waypoint is selected as the start waypoint. A dark blue box is drawn around the selected waypoint. If there are many markers and waypoints close together you may want to zoom in on the group in order to select the correct marker or waypoint without any problems. The message *Select End marker* will now appear in the status window.



4. Place the cursor close to the desired end waypoint, then press and release the left mouse button.

5. The closest marker or waypoint is selected as the end waypoint. A dark blue box is drawn around the selected waypoint and a dotted line is drawn between the start and end waypoints. This line designates the route for the selected leg of the survey. The *Track Survey* dialog is displayed, the status window is cleared of the *Select End marker* message and you are returned to the Sea Scan plotter. The *Track Survey* check box will appear pressed down and backlight with the color white indicating that the *Track Survey* dialog is currently displaying survey navigational information.

Advancing to Next Leg in Survey

1. Upon arriving within the arrival radius of the end waypoint, the current survey leg is completed. The cursor will change to the "track survey selection" cursor again and the message *Select next marker* will appear in the status window.

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1. Place the cursor close to the desired end waypoint, then press and release the left mouse button.

1. The closest marker or waypoint is selected as the end waypoint of the new survey leg. The end waypoint of the previous survey leg is automatically set as the start waypoint of the new survey leg. The dark blue box is removed from the start waypoint of the previous leg and a dark blue box is drawn around the end waypoint of the new survey leg. Furthermore, the dotted line is now moved between the start and end waypoints of the new survey leg. The contents of the *Track Survey* dialog are updated with the new information. The status window is cleared of the *Select next marker* message and you are returned to the Sea Scan plotter.

1. To end the track survey operation, select the previous end waypoint when prompted to advance to the next survey leg. The dark blue boxes are removed from the start and end waypoints and the dotted line is removed. The *Track Survey* dialog is also removed and you are returned to the Sea Scan plotter.

Track Survey Dialog Layout

The *Track Survey* dialog is an extension of the *Rng/Bearing* dialog. Apart from the Range/Bearing information, it also contains sections for Cross-Track Error and Arrival Radius.

The cross-track error (XTE) is displayed directly below the compass rosette. The arrow indicates the survey vessel's position with respect to the XTE range. If the vessel moves too far to port, the port XTE alarm bar will fill in with a dark red color. Similarly if the vessel moves too far to starboard, the starboard XTE alarm bar will fill in with a dark green color. The XTE range is set by the *XTE Rng* edit control. The pilot can steer along the specified survey leg by monitoring the vessel's lateral location with respect to the cross-track range. The XTE is updated every time new information is available from the external navigational source.

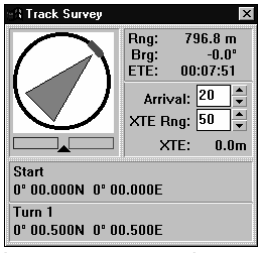

Figure 4-15 Track Survey Dialog

The arrival radius, as set by the *Arrival* edit control, is a proximity alarm around the end waypoint. When the vessel is within the arrival radius, the survey leg is considered to be completed. However, the *Track Survey* dialog will continue to display Range/Bearing information relative to the current end marker until the operator has updated the end marker.

The start and end waypoints are identified below the XTE bars. The identifier string and location for both waypoints are displayed. The start waypoint is listed first, followed by the end waypoint. If the identifier string of either waypoint is changed, using the *Marker/Waypoint Rename* button, the identifier string in the *Track Survey* dialog is updated as well.

4.7.5.5 Marker and Waypoint Rename

Every marker and waypoint has an identifier string. The identifier string is used to uniquely identify each of the markers and waypoints. To change the identifier string for a specific marker or waypoint:

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1. Select the *Marker/Waypoint Rename* button in the plotter tool bar. The cursor will change to the "marker/waypoint rename" cursor and *Rename marker* will appear in the status window.

2. Place the cursor close to the desired marker or waypoint, then press and release the left mouse button.

3. The closest marker or waypoint is selected. If there are many markers and waypoints close together you may want to zoom in on the group in order to select the correct marker or waypoint without any problems. The *Rename Marker* dialog is displayed.

Figure 4-16 Rename Marker Dialog

4. The current identifier string is displayed for reference and also in the New Identifier String text box. Enter a new identifier string. The string may be up to 31 characters without any spaces.

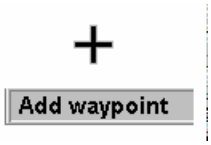
5. Save the new identifier string for the selected marker or waypoint by clicking the *OK* button or hitting Return. The new identifier string is assigned to the selected marker or waypoint, the status window is cleared of the *Rename marker* message and you are returned to the Sea Scan plotter.

   Cancel the new identifier string by clicking the *Cancel* button. The new identifier string is not recorded, the status window is cleared of the Rename marker message and you are returned to the Sea Scan plotter.

4.7.5.6 Waypoint Add

Waypoints may be placed on the Sea Scan plotter graphically to mark a location. These waypoints are useful to identify predefined sites and survey routes.

1. Select the *Waypoint Add* button in the plotter tool bar. The cursor will change to the "waypoint add" cursor and *Add waypoint* will appear in the status window.



2. Center the cursor over the desired location, then press and release the left mouse button.

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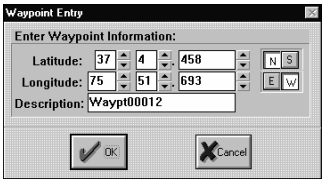
3. A waypoint is placed at the selected location and the cursor is changed back to the normal arrow cursor. The new number of waypoints is displayed in the status window and the rest of the status window is cleared of the *Add waypoint* message. The number of the waypoint, for example 14, is automatically used to create the unique identifier strings, for example *Waypt0014*. The identifier string may be changed at any time.

4.7.5.7 Waypoint Type

Waypoints may be placed on the Sea Scan plotter to mark a location by entering either the L/L or UTM coordinates. These waypoints are useful to identify precisely positioned predefined sites and survey routes.

1. Select the *Waypoint Type* button in the plotter tool bar. The *Waypoint Entry* dialog is displayed.



2. In Lat/Long mode, enter the latitude and longitude of the waypoint coordinate by setting the degrees, minutes and decimal minutes values in the appropriate text boxes. Set the latitude hemisphere by clicking either the *North* or *South* button. For example, if the northern hemisphere is selected, the *North* button will appear pressed down and backlight by the color white. Similarly, set the longitude hemisphere by clicking either the *East* or *West* button. In UTM mode, enter the northing, easting and zone information in the appropriate text boxes.

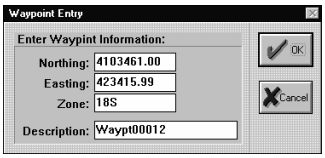


Figure 4-17 Waypoint Entry Dialogs

3. Enter the identifier string. The string may be up to 31 characters without any spaces. A default string, consisting of the name *Waypt* and the number of the new waypoint, for example *Waypt0014*, is assigned in the identifier string text box. The identifier string is used to uniquely identify the markers and waypoints. The identifier string may be changed at any time.

4. Save the new waypoint by clicking the *OK* button. If any of the entries are invalid, you will be alerted and remain in the *Waypoint Entry* dialog. You will not be able to exit by clicking the *OK* button unless all the entries are valid. If all the entries are valid, the new waypoint is recorded and placed at the selected location. The new number of waypoints is displayed in the status window and you are returned to the Sea Scan plotter.

   Cancel the new waypoint by clicking the *Cancel* button. The new waypoint is not recorded and you are returned to the Sea Scan plotter.

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4.7.5.8 Marker and Waypoint Delete

Markers and waypoints may be removed from the Sea Scan plotter. The *Marker Delete* and *Waypoint Delete* buttons perform the identical functions on markers and waypoints respectively. Selecting the *Marker Delete* button will only delete markers (red and purple squares). Selecting the *Waypoint Delete* button will only delete waypoints (green cross). You can delete a single marker/waypoint, the entire set of marker/waypoints, or a selected group of marker/waypoints. The following instructions apply to both markers and waypoints.

1. Select the *Marker Delete* button in the plotter tool bar to delete markers. The cursor will change to the "marker delete" cursor and *Delete markers* will appear in the status window.

2. To delete a single marker, move the cursor close to the marker you want to erase. Then, press and release the left mouse button. The marker closest to the cursor is erased. This action may not be undone. If there are many markers close together, you may want to zoom in on the group in order to select the correct marker without any problems.

   To delete a selected group of markers, move the cursor to one corner of the group. Press the left mouse button and, keeping the left mouse button pressed down, move the mouse to the opposite corner of the group. A black box will be drawn, indicating the selected group, as you move the mouse. Upon releasing the left mouse button, all markers within the black selection box will be erased.

   To delete all of the markers, hold down the **Control** key when you press the left mouse button. This action may not be undone.

3. The new number of markers and waypoints is displayed in the status window, the status window is cleared of the *Delete markers* message, and you are returned to the Sea Scan plotter.

The preceding instructions apply to deleting waypoints, however, you must select the *Delete Waypoint* button. The message *Delete waypoints* is written to the status window instead and only waypoints are deleted.

4.7.5.9 Marker and Waypoint Save

The markers and waypoints may be saved to disk. Even markers and waypoints that are not visible within the plotter boundary coordinates are stored. This feature allows you to store a series of commonly used waypoints. Whenever the stored series of waypoints are required, they may be read and displayed in the plotter, as described in the next item description.

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Select the *Marker and Waypoint Save* button in the plotter tool bar to save all the markers and waypoints in a waypoint data file. The waypoint data file is named automatically and is placed in the current data directory. A storage message, such as *Saved – 14OCT001.MKR,* is displayed in the status window. Please refer to **Marker/Waypoint Data File** 168 for more information about the waypoint data file format.

4.7.5.10 Marker and Waypoint Read

The markers and waypoints may be read from disk. This feature allows you to display a set of waypoints that have been previously stored or typed into a properly formatted waypoint data file with a simple text editor. Please refer to **Marker/Waypoint Data File** 168 for more information about the waypoint data file format.

Select the *Marker and Waypoint Read* button in the plotter tool bar to read the markers and waypoints from a waypoint data file. You will be prompted by the *Open Marker File* dialog to select a valid waypoint data file. Upon selection of a valid waypoint data file, the Sea Scan plotter will attempt to read all of the markers and waypoints. If for any reason the Sea Scan plotter cannot read all of the markers and waypoints you will be informed of the number of successful reads. The new number of markers and waypoints is displayed in the status window. The new markers and waypoints from the waypoint data file are displayed immediately although some may not be visible in the current plotter boundary coordinates. To ensure that you can see all of the markers and waypoints, select the *Automatic Configuration* button while holding down the **Control** key. This will automatically center the track points as well as all the markers.

4.7.6 Measure Distance

You can measure distance, as range and bearing, between two points on the plotter using the cursor. The range and bearing for the distance measurement are displayed in the status window. The most recent information remains in the status window until another measurement is made or a marker is selected or another action that makes use of the status window is selected. Alternatively, the status window may be cleared at any time by clicking in the window.

1. Select the *Distance* button in the plotter tool bar. The cursor will change to the "measurement" cursor and the message *Measure distance* will appear in the status window.

2. Center the cursor over the position on the plotter that you would like to measure from and press the left mouse button. The current location will be displayed in the status window.

3. Keeping the left mouse button pressed down, move the mouse to the point you would like to measure to. The location of the cursor, and the distance and bearing from the starting position are continuously updated as the cursor is moved to the ending position.

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4. When at the ending position release the left mouse button. The location of the ending position, and the distance and bearing from the starting position will remain displayed in the status window. The most recent information remains in the status window until another distance measurement is made or a marker is selected or another action that makes use of the status window is selected. Alternatively, the status window may be cleared at any time by clicking in the window.

4.7.7 Measure Area

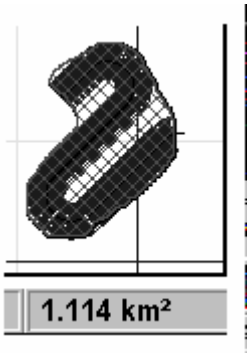
You can measure an area of the Sea Scan plotter by tracing the outline with the cursor. This feature is useful to measure the amount of area covered by a survey. The outlined region is defined with a red crosshatched pattern and the area of the region is displayed in the status window.

1. Select the *Area* button in the plotter tool bar. The cursor will change to the "measurement" cursor and the message *Measure area* will appear in the status window.

2. Place the cursor along the edge of the region you would like to measure and press the left mouse button. The current location will be displayed in the status window.

3. Keeping the left mouse button pressed down, move the mouse along the edge of the region you would like to measure. A red outline is drawn to indicate the path of the mouse as it is moved to the final position. The location of the cursor is continuously updated as the cursor is moved around the outline of the region.

4. When at the final position, release the left mouse button. A straight line is drawn from the final position to the initial position to close the outline around the region. Upon successfully calculating the area, the measured area is displayed in the status window. The outlined region used for the area measurement is indicated in the Sea Scan plotter with a red crosshatched pattern. The most recent information remains in the status window until another area measurement is made or a marker is selected or another action that makes use of the status window is selected. Alternatively, the status window may be cleared at any time by clicking in the window.



4.7.8 Clear Track

Select the *Clear Track* button in the plotter tool bar to clear the plotter. The track positions and estimated swath coverage lines are erased.

Hold the **Control** key and select the *Clear Track* button in the plotter tool bar to undo the latest *Clear*

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Track action. As long as the navigational information still exists in the position buffer, the track positions and estimate swath coverage lines will be redrawn on the plotter.

Markers and waypoints are not cleared. To erase markers and waypoints, please refer to the markers and waypoints description above.

4.7.9 Import Survey Plotter

Select the *Import Survey* button in the plotter tool bar to import a survey plotter. A standard *File Open* dialog will appear and you are prompted to select a valid MSTIFF data file (*.mst*). Any existing information recorded on the survey plotter is deleted. The survey plotter stored in the selected MSTIFF data file replaces the existing survey plotter.

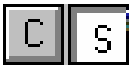
4.7.10 Draw to Survey Plotter

Select the *Draw to Survey Plotter* check box to draw the navigational information, including the estimated swath coverage, on the survey plotter. When selected the check box will appear pressed down and backlight with the color white. If the check box is not selected, the incoming navigational information is not drawn to the survey plotter. This check box allows you to select when the incoming navigational information is recorded on the survey plotter.

4.7.11 Active Plotter Selection

Both the current and survey plotters are displayed in the single display window. The *Current Plotter* and *Survey Plotter* buttons toggle the display of the active plotter in the display window.

Select the *Current Plotter* button to display the current plotter in the display window. The *Current Plotter* button will appear pressed down and backlight with the color white. The word *CURRENT* is written to the lower right corner of the plotter in the display window to indicate the current plotter is displayed. Similarly, select the *Survey Plotter* button to display the survey plotter in the display window. The *Survey Plotter* button will now appear pressed down and backlight with the color white. The word *SURVEY* is written to the lower right corner of the plotter in the display window to indicate the survey plotter is displayed.



The track points and swath coverage lines are written to both plotters, no matter which plotter is displayed in the display window. You cannot perform certain operations on the survey plotter, such as clear the track positions. When setting boundary coordinates and display parameters, with any of the functions accessed from the plotter tool bar, the changes affect the active plotter only. For example, if the current plotter is active and you select the *Automatic Configuration* button, the current plotter boundary coordinates are changed and the survey plotter boundary coordinates remain unchanged. The only exception to this rule is the addition and removal of markers and waypoints. Markers and waypoints are added to and removed from both plotters, no matter which plotter is active.

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4.7.12 Plotter-Sonar Image Interaction

4.7.12.1 Overview

The Sea Scan plotter and sonar image are closely related. When the navigational information is available, the source of each sonar record line can be correlated with an associated position and heading. Thus any feature seen in the sonar image can be associated with an estimated swath line and thus a known position along the swath line. However, there are situations such that the position may not be calculated from the available navigational information. In this case, you will be informed why *Sea Scan PC* is unable to determine a position by a message in the plotter status window.

This is a powerful tool for marking site location. The operator may scroll through the sonar image, identify a feature and then mark that feature's estimated location on the plotter. The marker position may also be transmitted to an external device. See 6.7 Output (p. 6-27) for more information.

4.7.12.2 Marking a Feature - Fast Method

1. Place the cursor at the feature in the sonar record.
2. Double click the ***right*** mouse button – quickly press and release the ***right*** mouse button twice.

   The location for the selected feature in the sonar record is logged in the marker list. The location is marked on the Sea Scan plotter with a marker if it is within the plotter boundary coordinates. The number of the marker is used to create the unique identifier string automatically. The combined number of markers and waypoints is updated in the status window. If the marker output option is enabled, the contact message is sent to the external device.

4.7.12.3 Marking a Feature - Standard Method

1. Place the cursor at the feature in the sonar record.
2. Double click the ***left*** mouse button – quickly press and release the ***left*** mouse button twice.
3. The feature has been identified as a target. Before recording the target you will be prompted to enter more information about the marker. The *Target Identification* dialog will appear.

   The *Target Identification* dialog is an enhancement of the *Height Measurement* dialog, however, the *Target Identification* dialog displays more information about the target. See **Height Measurement Dialog** 80 for more information about the *Height Measurement* dialog. In addition to the A-mode, B-mode, Geometry view and Transducer Information as shown in the *Height Measurement* dialog, the *Target Identification* dialog displays Orientation, External Information, Navigation Information and Target Information. You can also enter a Name for the marker.

   The Orientation section displays the orientation of the survey vessel, towfish, swath line and target along the swath line. This orientation is generated based on the navigational information, range, range delay and layback. This orientation diagram is updated continuously as the bottom and object sliders are moved.

   The External Information section displays the surrounding water depth as recorded from an external fathometer. If a magnetometer is available, the surrounding gamma readings are also displayed. The marker location is indicated with a vertical red line.

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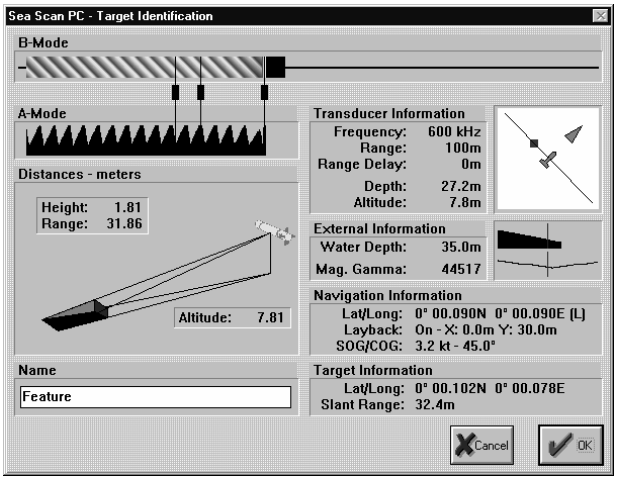

Figure 4-18 Target Identification Dialog

4. Set the three sliders to accurately define the marker location along the swath and the object height. Furthermore, enter a unique name to identify this target.
5. Select the OK button to record this complete target information as a marker. The complete target information for the selected feature in the sonar record is logged in the marker list. The location is marked on the Sea Scan plotter with a marker if it is within the plotter boundary coordinates. The combined number of markers and waypoints is updated in the status window. If the marker output option is enabled, the contact message is sent to the external device. The Target Identification dialog is removed and you are returned to the normal Sea Scan PC operation.

   Alternatively, select the Cancel button to cancel the target identification. The target information for the selected feature is not recorded as a marker. The Target Identification dialog is removed and you are returned to the normal Sea Scan PC operation.

4.7.12.4 Calculating Position for Marker

Standard Calculation

The latitude and longitude position of the feature in the sonar image is calculated from the navigational information. When the navigational information is available, the source of each sonar record line can be correlated with an associated L/L position and COG. Typically, the exact L/L location of the source is interpolated between two neighboring position fixes. Using the interpolated L/L position and the COG, *Sea Scan PC* can orient the swath coverage for any sonar record line. Thus, any offset from the source, along the length of the swath can be associated with a L/L position also. It follows then, that any feature in the sonar image can be assigned a L/L position based on its offset from the source along the swath, the L/L position of the source, and the orientation of the swath.

If the L/L position of the source for the sonar record line is available, the selected feature will be marked on the plotter with one of the two marker types.

Estimated Marker

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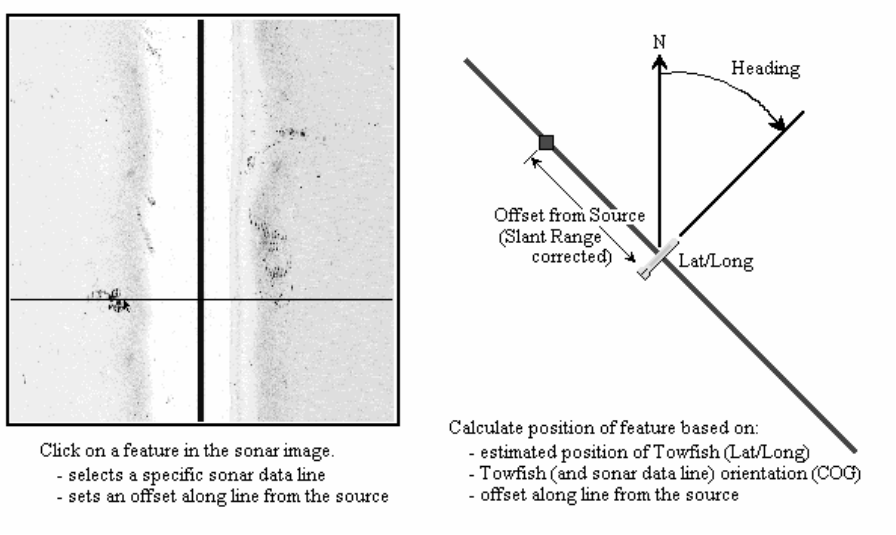
N
Heading
Offset from Source
(Slant Range
corrected)
Lat/Long
Click on a feature in the sonar image.
- selects a specific sonar data line
- sets an offset along line from the source
Calculate position of feature based on:
- estimated position of Towfish (Lat/Long)
- Towfish (and sonar data line) orientation (COG)
- offset along line from the source

Figure 4-19 Calculation of Lat/Long for Estimated Marker

If the COG is available, the marker position is determined as described above. The actual position along the length of the swath is used to mark the selected feature. This is known as an "estimated" position and is marked with a red square. The default identifier string consists of the name *Est* followed by the marker number, for example *Est0015*. You may change this name at any time using the *Rename Marker* button in the plotter tool bar.

Nadir Marker

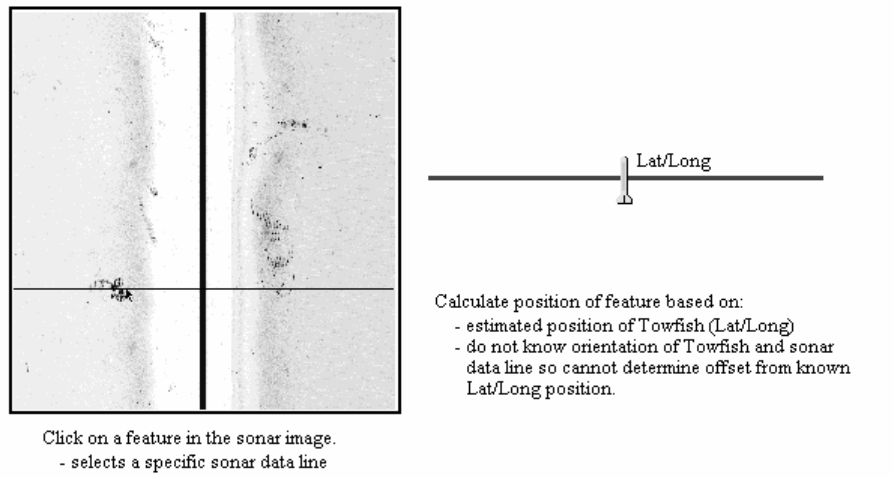
Lat/Long
Click on a feature in the sonar image.
- selects a specific sonar data line
Calculate position of feature based on:
- estimated position of Towfish (Lat/Long)
- do not know orientation of Towfish and sonar
data line so cannot determine offset from known
Lat/Long position.

Figure 4-20 Calculation of Lat/Long for Nadir Marker

If the COG is not available, the orientation of the swath cannot be determined. In this case, *Sea Scan PC* has no way of knowing the L/L of a feature that is offset from the source of the selected sonar record line. Thus, the position of the source is used to mark the selected feature. This is known as a "nadir" position and is marked with a purple square. The nadir is the point along the swath that is directly beneath the towfish. The default identifier string consists of the name *Nadir* followed by the marker number, for example *Nadir0016*. You may change this name at any time using the *Rename Marker* button in the plotter tool bar.

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No Marker

If the L/L position of the source for the sonar record line is not available, the position of the selected feature cannot be marked. In this case, you are alerted with a message in the plotter status window that the *Sea Scan PC* was unable to determine a L/L position for the selected feature.

4.8 Zoom

4.8.1 Overview

The *Sea Scan PC* allows you to zoom in on any section of the sonar image. The selected section is displayed in a separate window that floats on top of the data window containing the new incoming sonar data. You may perform multiple zooms on the selected section and also measure features contained in the zoom window. This allows for a more accurate measurement of smaller features, since you can place the cursor more precisely at the beginning and end of the feature.

Each sonar record line is recorded at twice the horizontal screen resolution. Thus, there are twice as many horizontal pixels than can be displayed on the screen in the normal viewing mode. Thus, when the image is zoomed, new information is displayed in the axial (horizontal) range. The pixels in the normal viewing mode in the data window are not simply made "chunkier" to make the image larger in the zoom window. The image in the zoom window is reconstructed from the raw sonar image data to display the full resolution of the sonar record lines. However, the lines are doubled in the transverse (vertical) axis to maintain the constant 1:1 aspect ratio for the zoomed image.

4.8.2 Selecting a Zoom Section

There are two methods for selecting a section to be displayed in the zoom window. You can either select a section with default dimensions (80 x 80 pixels) or you can select a section with any dimensions up to the maximum size of 160 x 200 pixels.

1. Select the *Zoom* check box in the Sea Scan tool bar to select a section of the sonar image to zoom. The check box will appear pressed down and backlight with the color white. The cursor will change to the "zoom selection" cursor.

2. To zoom in on an 80x80-pixel section, center the cursor over the section you would like to zoom in on. Then press and release the left mouse button without moving the cursor. The selected section with the default 80 x 80 pixel dimension will appear centered in the zoom window.

   The selected section may not extend past the physical edges of the sonar record. In this case, when selecting an object at the edge of the sonar image, the zoomed edge is set to the physical edge and the selected image is off-center in the zoom window.

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3. Alternatively, you may select a section of any reasonable dimension (maximum 160 x 200). The section to be zoomed does not have to be 80 x 80 pixels. Place the cursor on one corner of the section you would like to zoom in on. Press the left mouse button and, keeping the left mouse button pressed down, move the mouse to the opposite corner of the section. A black box will be drawn, indicating the selected section, as you move the mouse.

   If you have selected a section that is greater than the 160 x 200 maximum dimension, the edges of the selected section will not be displayed in the zoom window. The selection will be truncated around the edges.

4. The selected image is displayed in the zoom window. It is at x2 the zoom scale of the image shown in the data window. As stated previously, new axial (horizontal) information is displayed since the data has twice the axial resolution than what is displayed in the data window. However, the transverse (vertical) lines are doubled to maintain the proper 1:1 aspect ratio for the image.

4.8.3 Zoom Window

4.8.3.1 Overview

A zoom window is used to display the selected section of the sonar image. The window also enables you to do the following: perform multiple level zooms; select a new section; remap the color lookup table; and measure the length of a feature in the selected section. The zoom window consists of two sections: the zoom tool bar along the left side; and the zoom display section that displays the zoomed image.

Figure 4-21 Zoom Window

4.8.3.2 Zoom Toolbar

The zoom tool bar allows you to perform various actions with the image that is displayed in the zoom window.

4.8.3.3 Zoom Again Button

Press the *Zoom Again* button to repeat the zoom selection process again. Upon pressing the button, the zoom window will be removed and the zoom selection process is initiated. As described earlier, the cursor will change to the “zoom selection” cursor. You may now select a new section of the sonar image to display in the zoom window.

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4.8.3.4 Zoom In by Position Button

Press the *Zoom In by Position* button to zoom in a specific section of the image displayed in the zoom window. The cursor will change to the "zoom selection" cursor. Center the cursor over the section in the zoom window you would like to zoom in on, then press and release the left mouse button. The selected section will be centered in the zoom window at twice the previous zoom scale. The selected section may not extend past the physical edges of the previous image. In this case, when selecting an object at the edge of the previous image, the zoomed edge is set to the physical edge and the selected image is off-center in the zoom window. The zoom scale will be updated to represent the new scaling.

4.8.3.5 Zoom In Button

Press the *Zoom In* button to zoom in the previous image displayed in the zoom window. The previous image will remain centered in the zoom window at twice the previous zoom scale. The edges will be truncated in the new view. The zoom scale will be updated to represent the new scaling.

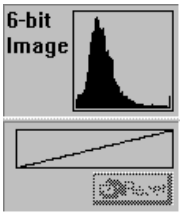
4.8.3.6 Zoom Out Button

Press the *Zoom Out* button to zoom out the image in the zoom window. The image extents are increased in all directions automatically by a factor of two. Thus the current image is centered in the new zoom image. You cannot zoom out beyond the zoom factor at which the image was originally displayed in the zoom window. The zoom scale will be updated to represent the new scaling.

4.8.3.7 Zoom Scale

The *Zoom Scale* indicates the level of magnification that has been performed on the original data. For example, if the zoom scale is set at *Zoom x4*, then the original image from the data window has been magnified x4. The zoom scale is always incremented by a factor of two since the image is doubled each time you zoom in again with the *Zoom In by Position* and *Zoom In* buttons.

4.8.3.7.1 Pixel Intensity Histogram and Color Look Up Table



This section displays a histogram of the intensities of the pixels in the active zoom image and the color look up table. The relative height of each histogram bar represents the number of pixels in the active zoom image with the intensity related to the histogram bar position. The left most histogram bar represents the number of pixels with an intensity of 0 (no acoustic return). The right most histogram bar represents the number of pixels with an intensity of 255 (maximum acoustic return). The histogram bars are scaled relative to the largest histogram bar. However, if one of the histogram bars dominates the histogram plot, the bar is clipped and the remaining histogram bars are scaled with a more appropriate scaling factor.

The color look up table indicates the mapping transformation from the 8-bit sonar intensity data (0-255)

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to the 6-bit display data (0-63). The default color look up table is a straight ramp that maps the intensity data to the display data as a linear function.

In addition to displaying the intensity distribution of the zoom image, the pixel intensity histogram can be used to apply a selective thresholding on the zoom image. This is also known as contrast stretching. The contrast stretching operation remaps the color look up table based on the lower and upper thresholding limits selected by you from the histogram. The purpose of this operation is to make better use of the full range of intensity values to display the image. Low contrast images, where most of the image is dark, can be expanded into the full range of intensities. Likewise, with images that appear too bright, the distribution of pixel intensities can be stretched to use the entire range of pixel intensities. This operation will result in a more balanced image.

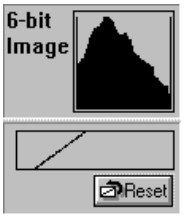
To select the thresholding limits:

1. Move the cursor to the lower thresholding limit in the pixel intensity histogram.

2. Press the left mouse button down. The cursor will automatically move 16 pixel intensities to the right. This is the minimum intensity value for the upper thresholding limit for the selected lower thresholding limit. The histogram bars will be redrawn such that the intensity values in the selected thresholding limits are drawn in white on a dark gray background.

3. Keeping the left mouse button pressed down, move the cursor to the upper thresholding limit. The histogram bars are continuously updated, such that the intensity values in the selected thresholding limits are drawn in white on a dark gray background.

4. Release the left mouse button to select the upper thresholding limit.



Once a set of thresholding limits have been selected, the color look up table is remapped. The color look up table is modified to indicate the current thresholding limits. The 8-bit sonar data is then remapped using the new color look up table and redisplayed in the zoom image section. All pixels with an intensity value less than the lower thresholding limit are remapped to an intensity of 0 (minimum pixel intensity). All pixels with an intensity value greater than the upper thresholding limit are remapped to an intensity of 63 (maximum pixel intensity). All pixels with an intensity value within the thresholding limits are remapped such that the range of intensities within the thresholding limits are stretched to fill the entire range of possible intensity values. The pixel intensity histogram is recalculated to indicate the proper distribution for the new zoom image that has undergone the new color look up table transformation.

Select the *Reset CLUT* button to reset the color look up table to the default transformation. Any selective thresholding of the original pixel intensity histogram will be cancelled and the zoom image will be returned to the original state.

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4.8.3.8 Length Button

You can measure the length of any object in the zoom window using the cursor. This is the preferable situation to accurately measure smaller features, since you can place the cursor more precisely at the beginning and end of the feature. A *Zoom Length* dialog is used to display the transverse, axial and total lengths.

This length measurement process is identical to the process used to measure length in the data window. Note that the *Zoom Length* dialog can only measure features in the zoom window and the *Data Length* dialog can only measure features in the data window. You measure features in both windows in the exact same way. Please refer to **Length Measurement** 77 for more details on the length measurement process.

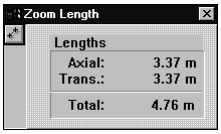

Figure 4-22 Zoom Length Dialog

4.9 Gain

4.9.1 Overview

The *Sea Scan PC* transducers produce a very specifically defined acoustic signal. The acoustic signal may be thought of as a fan of sound reaching out from the transducer source. Viewed from above the signal is very narrow and viewed from the side the signal is wide. This shape of acoustic sound allows the transducer to "look" at a very narrow section perpendicular to its path of motion. As the out-going acoustic signal travels through the water, the signal strength at the wave front weakens by a variety of influences, such as absorption by the water, wave front spreading, and scattering. These are known physical effects of acoustic energy traveling through a lossy medium. As a result, the amount of energy available to reflect from an object reduces as the outgoing acoustic wave travels away from the source. The reflection from a distant object is not as strong as that from a like object closer to the transducer (source of the acoustic wave). However, for sonar record display and interpretation it is desirable to maintain a constant level for the background echo return intensity. This is achieved by adding gain compensation to the raw echo returns to counterbalance the losses to the signal strength as the wave traveled through the water. The amount of gain required to counterbalance the losses due to signal attenuation are strongly proportional to, but not entirely dependent on, range. Since range may be thought of as time (it takes a known time for a signal to return from any given range), the time dependent gain compensation is known as the **time-gain compensation** (TGC). Thus, a target at a 150-meter range may be made to have the same echo strength as a like target at a 50-meter range. Different seafloor conditions and target characteristics can result in vastly different attenuation levels at a given range. As a result, you must always set the TGC for the current operating environment. Using the gain controls in the gain window, you are able to define the amount of gain applied to the raw echo returns at specific ranges (time intervals).

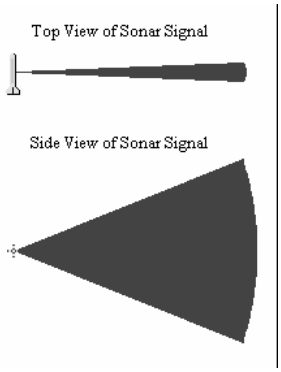

Figure 4-23 Sonar Signal

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4.9.2 Gain Sequence

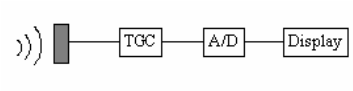

Figure 424 Signal Processing

The transducer receives the acoustic signal that has been reflected from the seafloor and objects on the seafloor. This acoustic signal, mechanical energy, is converted to an analog electrical signal by the transducer. The raw analog signal is then gain adjusted based on the TGC curves set in the gain window for the two sonar channels. The TGC adjusted analog signal is then digitized and displayed on a horizontal line in the data window.

4.9.3 Gain Window

The gain window allows you to adjust the time gain compensation for both sonar channels either independently or in tandem. Apart from the caption bar, the gain window consists of: the Time Gain Compensation Display and Signal Response section; the Range Interval Gain Control section; the Group Gain Control buttons; and the Scroll Position Warning section.

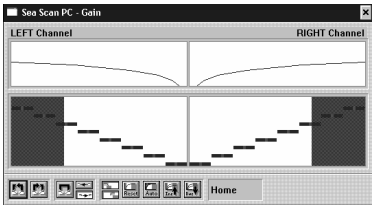

Figure 4-25 Gain Window

4.9.3.1 Channel Orientation

The current operating and display parameters are used to orient the channel display in the gain window. For example, if the data direction is set to scroll down, the left sonar channel is on the left side of the display, and the right sonar channel is on the right side. Likewise, if the data direction is set to scroll up, the left sonar channel is on the right side of the display, and the right sonar channel is on the left side. The gain controls on the right side of the gain window will adjust the gain settings for whichever channel is displayed on the right side of the gain window. Similarly, the gain controls on the left side of the gain window will adjust the gain settings for whichever channel is displayed on the left side of the gain window.

4.9.3.2 Color Coding

A consistent color-coding scheme is used to display the different sections of the possible sonar swath. The gain controls allow you to adjust the gain over the total possible range of the *Sea Scan PC*, from 0 to 1000 meters range. Depending on your range setting, the possible range will be a smaller portion of the total possible range. For example, with a range setting of 100 meters, the possible range is 0 to 200 meters, taking into account the maximum possible range delay. The active range, the range that is being “looked at” by the *Sea Scan PC*, is anywhere in this possible range, depending on the distance of the range delay. Recall that the range delay setting can delay the active range a distance equal to the range setting itself. For example, at a 100-meter range, and taking into account a possible range delay distance of another 100 meters, the full possible range is 200 meters.

The total possible range is always displayed in dark gray. The possible range, within the total possible range, is displayed in light gray. The active range, that which is being “looked” at by the *Sea Scan PC,* within the possible range, is displayed in white.

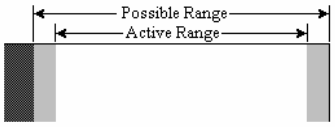

Figure 4-26 Color Coding for Gain Window

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The color-coding is useful to determine the areas of the TGC that are actually affecting the active range. Only the sections of the TGC that are highlighted with a white background are in the active range, and thus being applied to the raw echo returns.

If the *Sea Scan PC* is set to use both channels, then an active range is displayed for both channels. However, if the *Sea Scan PC* is set to use only the left channel, there is no active range, as highlighted with a white background, for the right channel. Likewise, if the *Sea Scan PC* is set to use only the right channel, there is no active range for the left channel.

4.9.3.3 Time Gain Compensation and Signal Response Display

The *Time Gain Compensation and Signal Response* component displays the TGC curves for the two channels. The blue TGC curves are representations of the actual curves. They are only useful as estimates of the actual TGC curves that are applied to the raw analog signals. The TGC curves for the two channels are displayed as the amount of gain applied to the raw echo returns for specific range intervals.

The *Time Gain Compensation and Signal Response* component also displays the latest sonar record line in A-mode. This viewing mode provides a strong visual reference of the acoustic returns on a single sonar record line. This “bar chart” view displays the acoustic return intensity in the vertical axis. The vertical lines along the horizontal axis represent the intensity of the acoustic returns at the respective positions along the sonar record line. In other words, a short vertical line represents a low intensity acoustic return. Likewise a long vertical line represents a high intensity acoustic return. The vertical lines are drawn using the current color scale. The color changes as the line becomes longer. This color change as the intensity increases reflects the change in color that would be seen on the sonar record line in the data window. A red dot is used to mark the top of the vertical line since some lines may not show up well at certain intensities against the gray background.

The A-mode view of the signal response provides an accurate visual reference for the affect the TGC has on the raw signal. Changes to any of the gain parameters in the active range can be monitored by watching the immediate effect on the signal response.

4.9.3.4 Range Based Gain Control

The Range Based Gain Control section allows you to set the amount of gain at a specific range for either channel. The gain value for the total possible range for the *Sea Scan PC*, 0 to 1000 meters, is selectable at specific ranges. Most of the fine-tuning of the gain adjustment is required at the closer ranges, thus the selectable ranges are closer together at these closer ranges. The selectable ranges are at 2, 4, 8, 16, 32, 64, 128 and 1000 meters.

The amount of gain at each selectable range for each channel may be adjusted independently. However, there is a maximum differential between two adjacent gain settings that will limit the relative movement of two neighboring gain controls. In other words, the gain between two adjacent selectable ranges cannot change too drastically.

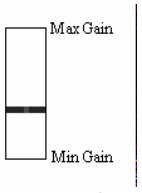

Figure 4-27 Gain Slide

The amount of gain at each selectable range is controlled with a gain slider control. The control operates on much of the same principle as an equalizer for a stereo amplifier. By lowering the red bar, the “level”, less gain is applied to the raw signal. Likewise, by raising the red bar more gain is applied to the raw signal. There is approximately 80 dB of dynamic range in the gain adjustment from the minimum to maximum levels.

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To adjust the red bar level, the amount of gain, for an individual range interval:

1. Place the cursor anywhere in the red bar and press the left mouse button. When both channels are coupled, you can select the gain control for either channel.
2. Keeping the left mouse button pressed down, move the red bar to the desired amount of gain. Then release the left mouse button. When both channels are coupled, the amount of gain is adjusted for both channels simultaneously. As the red bar is moved, the TGC curve, as described above, is continuously updated to reflect the new gain settings. Likewise, if the specific range interval is within the active range, the signal response will show the immediate affect of the new gain setting on the incoming sonar signal.
3. Alternatively, simply place the cursor at the desired gain setting, then press and release the left mouse button. The gain will be moved to the new setting automatically.

There is a set of 8 gain controls for each channel. The gain control at each selectable range for each channel is always displayed, even if adjusting its level will not have an effect on the active range. The color coding, described above, is used to represent the positions of the total possible, possible and active ranges in each of the gain controls. The set of gain controls on the right side of the gain window will adjust the gain settings for whichever channel is displayed on the right side of the gain window. Similarly, the set of gain controls on the left side of the gain window will adjust the gain settings for whichever channel is displayed on the left side of the gain window.

4.9.3.5 Group Gain Control

The *Group Gain Control* section allows you to set the amount of gain for the different range intervals for either channel as a group. As opposed to the individual gain controls in the *Range Interval Gain Control* section, which only affect the amount of gain for each specific range interval, this set of buttons affect the amount of gain for all the range intervals. There are certain situations where certain actions are invalid, such as when the two channels are coupled and you cannot select the *Automatic Gain* button. In these cases, the invalid buttons are disabled so you cannot select an invalid action. From left to right the *Group Gain Control* buttons are as follows:

Transfer to Left

Select the *Transfer to Left* button to transfer the entire set of gain settings for the channel on the right side of the gain window to the gain settings for the channel on the left side. The gain settings for the channel on the left side are changed immediately and the TGC display is updated with the new gain settings.

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Transfer to Right

Select the *Transfer to Right* button to transfer the entire set of gain settings for the channel on the left side of the gain window to the gain settings for the channel on the right side. The gain settings for the channel on the right side are changed immediately and the TGC display is updated with the new gain settings.

Couple

Select the *Couple* check box to couple the gain settings for the two channels. When selected, the *Couple* check box will appear pressed down and backlight with the color white. The gain controls for the two channels are now coupled. With both channels coupled, whenever the amount of gain for a specific range interval for one channel is adjusted, the amount of gain for the corresponding range interval for the other channel is adjusted equivalently. When the two channels are coupled, you cannot use the *Transfer to Left, Transfer to Right* and *Automatic Gain* buttons. The gain settings for the two channels must be able to be adjusted independently of each other during the automatic gain process. When the *Couple* check box is first pressed, transferring the entire set of gain settings from one channel to the other first equalizes the gain settings for the two channels. The *Couple Direction Transfer* buttons determines the direction of the transfer. To uncouple the two channels, simply select the *Couple* check box again. The *Couple* check box will now appear raised and the gain settings for the two channels can be adjusted independently again.

Couple Direction Transfer

When the *Couple* check box is first pressed, the entire set of gain settings are transferred from one channel to the other in order to equalize the two channels. Select the *To Left* button so the gain settings are transferred from the right side to the left side when the *Couple* button is selected. The gain settings from the channel on the right side of the gain window will be transferred to the gain settings for the channel on the left side to equalize the two channels. The *To Left* button will appear pressed down and backlight with the color white and the *To Right* button will appear raised. Only one direction transfer button may be pressed at any given time.

Likewise, select the *To Right* button so the gain settings are transferred from the left side to the right side when the *Couple* button is selected. The gain settings from the channel on the left side of the gain window will be transferred to the gain settings for the channel on the right side to equalize the two channels. The *To Right* button will now appear pressed down and backlight with the color white and the *To Left* button will appear raised.

Channel Selection

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These two check boxes allow you to selectively apply the group gain actions to either of the two channels. The actions initiated by the *Group Gain Control* buttons will only be applied to the gain settings for the channels on the left and right side if the respective channels are "selected." In other words, the check boxes for the channels on the left and right side must be selected for a group action to be applied to their respective gain settings. To "select" the channel on the left side of the gain window, select the *Left Channel* check box. The *Left Channel* check box will appear pressed down and backlight with the color white. Similarly, to "select" the channel on the right side of the gain window, select the *Right Channel* check box. The *Right Channel* check box will appear pressed down and backlight with the color white. As an example, assume the *Left Channel* check box is selected, but the *Right Channel* check box is not selected. If you then press the *Increment Gain* button, only the gain settings for the channel on the left side of the gain window will be incremented. Since the channel on the right side is not "selected," the group gain action is not applied to its gain settings. However, you will still be able to change the gain settings for the channel on the right side using the individual gain slider controls in the *Range Interval Gain Control* section. The "selection" state, as set by these two check boxes, only affects the application of the group gain actions.

In the event that neither channel is "selected," in other words both check boxes are not selected, you cannot perform any of the group gain actions.

Reset

Select the *Reset* button to reset the gain settings to default settings. As discussed above, this action is only applied to the channels that are "selected." The gain settings for the "selected" channels are changed immediately and the TGC display is updated with the new gain settings.

Automatic Gain

Select the *Automatic Gain* button to set the gain settings automatically to optimal settings for the current operating environment. Please note that when this action is selected, the gain settings are not adjusted continuously. They are simply set to optimal settings and then control of the gain adjustment is returned to you. While attempting to set the gain settings automatically, you will not be able to adjust the gain settings manually. The gain settings are set automatically based on the signal response and thus, the process is not exact and may require some final adjustments upon completion. As discussed above, this action is only applied to the channels that are "selected." Refer to **Setting Gain Automatically** 68 for more detailed information about the automatic gain process.

Increment

Select the *Increment* button to increment the entire set of gain settings. The amount of gain for each range interval is increased by approximately three percent of its original value. As discussed above, this action is only applied to the channels that are "selected." The gain settings for the "selected" channels are changed immediately and the TGC display is updated with the new gain settings.

Decrement

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Select the *Decrement* button to decrement the entire set of gain settings. The amount of gain for each range interval is decreased by approximately three percent of its original value. As discussed above, this action is only applied to the channels that are "selected." The gain settings for the "selected" channels are changed immediately and the TGC display is updated with the new gain settings.

4.9.3.6 Scroll Position Warning

When setting the gain, it is often useful to watch the general response of the sonar signal to the new gain settings in the data window. In order to see the immediate response, the data window must be in the "Home" state. As described in **"Home" State** 33 the "Home" state simply means the newest sonar line is displayed in the data window immediately. The message *Home* is written in the *Scroll Position Warning* section to signify the current scroll position of the data window. When not in the "Home" state, the sonar image has been scrolled and the newest sonar line is no longer visible on the screen.

The data window is not in the "Home" state. The message *Not Home* is written in the *Scroll Position Warning* section to warn you that the latest sonar data line, which is being affected by the latest gain settings, is not visible on the screen. In these situations, you will not be able to see the effect of the gain changes to the sonar data until the sonar data lines have scrolled in to the visible region of the data window. For this reason, you will probably want to ensure the data window is in the "Home" state while you are changing the gain settings.

4.9.4 Setting Gain Automatically

Select the *Automatic Gain* button in the *Group Gain Action* section of the gain window to initiate the automatic gain process. Alternatively, select the *Automatic Gain* button in the Sea Scan tool bar. The automatic gain process is only applied to the channels that are "selected." The automatic gain process sets the gain settings automatically to optimal settings for the current operating environment. The automatic gain settings may be adjusted in the *Automatic Gain Settings* dialog. Furthermore the automatic gain process may be monitored in the *AutoGain Status* dialog.

4.9.4.1 Automatic Gain Process

The automatic gain process attempts to adjust the amount of gain at each selectable range in the active range until it has determined that the gain settings are at optimal levels according to the current automatic gain settings. It does this by looking at the intensity of the background in the active range. The process attempts to adjust the gain settings such that there is a constant background level throughout the entire active range. This may or may not be possible for this particular automatic gain process depending on the current operating environment.

The automatic gain process samples the current sonar record line. Firstly, it determines the intensity of the background in the active range. It then determines the required gain adjustment change the background level to an optimal level. The gain is then adjusted. The gain slider controls in the *Range Based Gain Control* section are updated accordingly and the TGC display is updated also with the new gain settings. Thus, you can monitor the progress of the automatic gain process. When the next

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sonar record line is available, the process is repeated. Thus the *Sea Scan PC* must be powered on so consecutive incoming sonar record lines may be analyzed. This process is repeated until the intensity of the background in the active range is close enough to the optimal level. While attempting to set the gain settings automatically, you will not be able to adjust the gain settings manually.

If the process is having difficulty setting the gains properly, it may prompt you for further action. You may either cancel or continue the process, or you may selectively accept the gain settings. If you cancel the process, the gain settings are reset to their initial values. If you accept the gain settings as they are, you will have to adjust the gain settings for the selectable ranges manually to complete the process. By monitoring the process by watching the TGC and gain slider controls being continuously updated, you should be able to determine which selectable range was causing the difficulties. Alternatively, the *AutoGain Status* dialog will accurately display which selectable range is not adjusting properly. Alternatively, you can adjust the *Background Strength – Target* or *Deviation from Target – Tolerance* levels in the *Automatic Gain Settings* dialog and attempt the automatic gain process again.

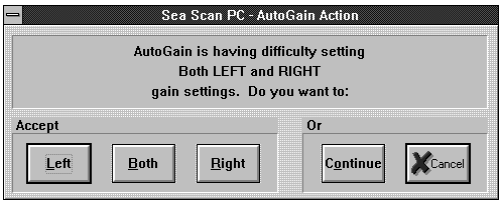

Figure 4-28 Automatic Gain Action Dialog

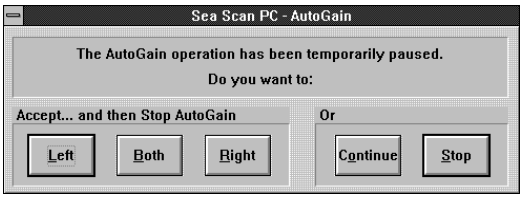

Figure 4-29 Automatic Gain Pause Dialog

If you would like to interrupt the automatic gain process simply click on the *Automatic Gain* button again. You will be prompted for further action. This is essentially the same dialog that is presented when the automatic gain process is having difficulty and prompts you for further action. You may either: accept the gain settings for either or both of the active channels; continue; or stop the entire automatic gain process.

4.9.4.2 Automatic Gain Settings

Select the Settings|AutoGain menu item in the Options menu to set the automatic gain settings. The *Automatic Gain Settings* dialog is displayed. The dialog consists of two sections: the Interval section; and the Background Strength section. To make a selection in the Interval section, place the cursor on the corresponding radio button, then press and release the left mouse button. The selected radio button will now appear marked and the previously selected radio button will be cleared. Only one radio button may be selected at any time.

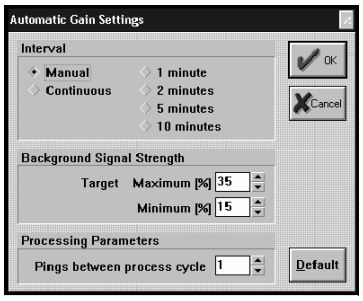

Figure 4-30 Automatic Gain Settings Dialog

Interval

The *Interval* section dictates how often the automatic gain process is automatically initiated. In *Manual* mode, the operator must initiate the process by pressing the *AutoGain* button in either the Sea Scan tool bar or the Group Gain Action section of the gain window. In *Continuous* mode, the automatic gain process is constantly active and adjusting the TGC curves based on the latest sonar data line. Note

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that this is only recommended for specialized operations and is not recommended for normal use. Alternatively, the automatic gain process may be initiated at timed intervals of *1 minute*, *2 minutes*, *5 minutes* and *10 minutes*. These timed intervals are useful for unattended survey operations.

Background Signal Strength

The *Background Signal Strength* section dictates the target intensity thresholds of the background level the automatic gain process is attempting to reach. The automatic gain process will continue to adjust the TGC curves until the background strength for all the gain bins falls within the target thresholds. The minimum and maximum target bounds are expressed as a percentage of the entire signal strength.

Processing Parameters

The *Processing Parameters* section dictates the amount of processing time the Auto Gain program uses on the host computer. Setting the number of *Pings Between Processing Cycles* informs the computer about how often you would like the Auto Gain program to run. Specifying 1 *Pings Between Processing Cycles* allows the Auto Gain program to operate every time Sea Scan PC collects 1 ping (line) of data. Specifying 3 *Pings Between Processing Cycles* allows Sea Scan PC to collect 3 pings of data before allowing the Auto Gain program to operate through 1 cycle. This has the effect of reducing the load on the host computer. It is recommended to set the *Pings Between Processing Cycles* to 1 if you have a fast computer (over 300 MHz) and to 3 if you have a slow computer. If you find that Sea Scan PC still is not as responsive as you would like please feel free to increase the *Pings Between Processing Cycles* to 5 or more.

4.9.4.3 Monitoring Autogain Process

You may monitor the automatic gain process by selecting the Status Boxes|AutoGain menu item from the Options menu. This menu command toggles the display of the *AutoGain Status* dialog. The dialog may be moved anywhere on the screen. When the dialog is removed, its position is remembered for the next time the dialog is displayed. The *AutoGain Status* dialog consists of three distinct sections: Current Status; Automatic Gain Settings; and Gain Bin Status.

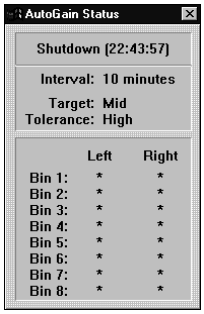

Figure 4-31 AutoGain Status box

Current Status

The Current Status section displays the current status of the automatic gain process. The message *Processing (#)* will appear while actively processing the sonar data. The number represents the number of sonar data lines that have been processed. Upon completion of the automatic gain process the message *Shutdown (hh:mm:ss)* will appear. The *hh:mm:ss* represents the time the automatic gain process was shutdown. This information is useful to determine when the next automatic gain process will occur when one of the timed intervals is active.

Automatic Gain Settings

This section displays the current automatic gain settings. See **Automatic Gain Settings** 69 for more information about the automatic gain Gain settings.

Gain Bin Status

This section displays the status of the individual gain bins for each channel. The status for each bin is

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indicated with one of the following marks:

-	(dash)	The channel is not selected for the automatic gain process. See **Channel Selection** 66 for more information about selecting channels for the *Group Gain Control* buttons.
*****	(star)	The actual sonar data background is within the tolerance of the target background strength.
X	(cross)	The actual sonar data background is outside the tolerance of the target background strength. The bin is considered to be invalid.
MAX#		There have been a maximum number of consecutive invalid readings for this bin. The number of consecutive invalid adjustments is listed after the MAX message.
AUTO		The gain has been set automatically even though the resulting background strength is outside the allowed tolerance level. This override has occurred because the automatic gain process was unable to set the gain for the designated bin within the acceptable tolerance.

4.10 Layback

4.10.1 Overview

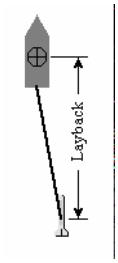

Figure 4-32
Layback

Layback refers to the surface distance between the position of the survey vessel, as indicated by the external navigation device, and the actual position of the towfish. The external navigation device typically indicates the precise position of the survey vessel, or more accurately the device antenna, and not the towfish. Since the sonar data represents data with respect to the towfish, it is important, when positioning targets in the sonar data, to be able to accurately position the towfish first. Knowing the exact position of the towfish is a difficult task. The layback offset compensates some of the inherent errors in accurately positioning the towfish with respect to the position provided by the external navigation device.

The *Layback* dialog allows you to set both the lateral and axial layback. The lateral layback indicates the offset distance from the position indicated by the external navigation device to the towfish to the port and starboard of the survey vessel. The lateral layback is useful if a long boom to the side of the survey vessel supports the towfish. The axial layback indicates the offset distance from the position indicated by the external navigation device to the towfish to the stern or forward.

The current layback is displayed in the Sea Scan tool bar, directly below the *Layback* button. The total surface layback, a combination of both lateral and axial layback, is displayed. If the layback is enabled, then two asterisks (**) will appear after the layback in the Sea Scan tool bar. Otherwise, if the layback is not enabled, the layback appears by itself.

NOTE: When the layback is enabled the calculated position of a target and the swath coverage displayed in the plotter are corrected automatically.

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4.10.2 Estimating Layback

For shallow water operations, in which there is a short distance to estimate, it is fairly simple to determine an accurate towfish layback from the antenna of the external navigation device. In shallow water operations, the towfish is typically close to the survey vessel. One can accurately estimate the separation distance of the towfish and the antenna. For deeper water operations, it is often times more difficult to estimate layback, especially with longer lengths of in-water cable. However, in these very specific situations with longer lengths of in-water cable, it becomes increasingly more important to estimate layback properly. The accuracy of the layback estimate directly affects the accuracy of target positioning. The basis of the positioning of targets in the sonar data record assumes accurate positioning of the towfish. The positioning of the towfish is never exact, but the closer the estimate to the actual position, the better the accuracy of the target positions.

There are a number of reliable methods to estimate layback. These methods work best in areas of minor mass water flow. Mass water flow due to tides and currents can significantly influence the layback. For example, if the survey vessel is moving against the current, the towfish speed relative to the water is increased and thus the drag force on the in-water cable is increased also. The increased drag force will lift the towfish up off the bottom and increase the layback. Alternatively, when moving with the current the drag force on the in-water cable is less and the layback will be decreased.

4.10.2.1 Single Pass

If you are fortunate to have an object that is visible both above and below the water surface, such as a buoy, channel marker or pier, this object can be used to determine your layback in a single pass. As the antenna passes by the object create a marker in the plotter at the vessels current location by double clicking with the right button on the newest sonar data line. When the same object appears in the sonar image, create a marker in the plotter by double clicking with the right button on the object. The layback distance is the distance between the two navigation points, as indicated by the two markers in the plotter. Be certain to measure from the sonar data line nadirs on which the markers are located and not from the markers themselves. Note that this layback is only valid as long as the operational parameters, such as towfish speed relative to the water and in-water cable length do not change. This method works best in areas of minor mass water flow. Mass water flow due to tides and currents can significantly influence the layback.

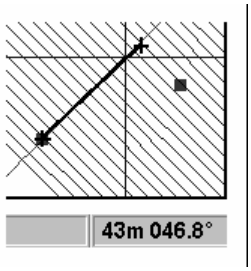

Figure 4-33 Single Pass Layback Estimate Method

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4.10.2.2 Double Pass in Opposite Directions

If you are fortunate to have a distinguishable underwater object, this object can be used to determine your layback in double passes in opposite directions. Moving in one of the directions of the proposed survey, as the object appears in the sonar image, create a marker in the plotter by double clicking with the right button on the object. Maintaining the same operational conditions, such as in-water cable length and height off the bottom, make a subsequent pass in the opposite direction. As the object appears again, create a second marker in the plotter by double clicking with the right button on the object. The layback distance is half of the distance between the two navigation points, as indicated by the two markers in the plotter. Be certain to measure from the sonar data line nadirs on which the markers are located and not from the markers themselves. Note that this layback is only valid as long as the operational parameters, such as towfish height off the bottom and in-water cable length do not change. This method works best in areas of minor mass water flow. Mass water flow due to tides and currents can significantly influence the layback.

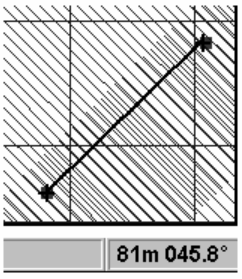

Figure 4-34 Double Pass Layback Estimate Method

4.10.2.3 Layback Lookup Chart

A layback lookup chart is a useful operational tool for estimating layback. However, the generation of a layback lookup chart specific to your operational conditions requires a considerable effort. A standard lookup chart plots the layback vs. cable length at varying speeds. A separate chart should be made for different towfish and depressor combinations. Once the layback chart is compiled you can simply estimate the layback based on cable length and the towfish speed relative to the water by referring to the chart.

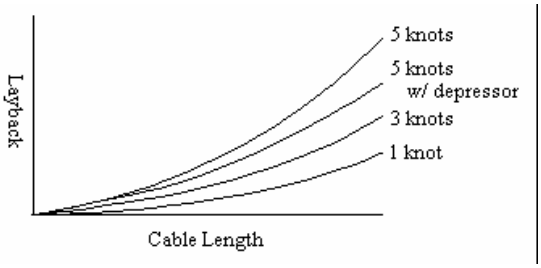

Figure 4-35 Sample Layback Lookup Chart

Using the single pass or double pass method described above, create a plot with the cable length on the x-axis and layback on the y-axis. Make multiple passes of the target at a constant speed with varying cable lengths. Plot the layback vs. cable length for this speed. Repeat this procedure at one to two knot increments.

4.10.2.4 Transponder

The layback can be determined using a transponder system, such as a Trackpoint II. Place a transponder on the towfish. Rebalance the towfish before deployment and determine the layback using the transponder system. Modify the layback settings in the *Layback* dialog as necessary.

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4.10.3 Towfish Layback Dialog

The *Layback* dialog allows you to set the towfish layback graphically. You can set a lateral layback, indicating the offset distance from port to starboard, and an axial layback, the offset distance astern or forward.

Apart from the caption bar, the *Layback* dialog consists of the Enable Layback check box, the X (Lateral) and Y (Axial) layback edit controls and the Diagram section.

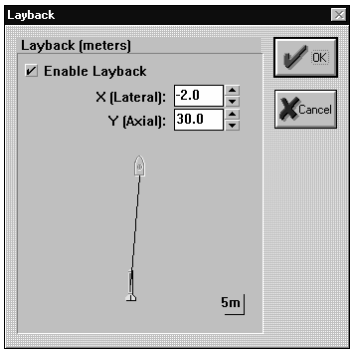

Figure 4-36 Layback Dialog

4.10.3.1 Displaying Layback Dialog

Select the *Layback* button in the Sea Scan tool bar to display the *Layback* dialog.

4.10.3.2 Setting Layback

Enter values in the *X (Lateral)* and *Y (Axial)* edit controls to set the layback distances. At (0,0), the towfish is considered to be in the same location as the null point of the survey vessel, the location of the antenna of the external navigation device. A negative and a positive value for the *X (Lateral)* distance sets the layback to the left and right respectively of the null point of the survey vessel. Similarly, a negative and a positive value for the *Y (Axial)* distance set the layback to the fore and aft respectively of the null point of the survey vessel.

Select the *Enable Layback* check box to enable the layback. When a check mark appears in the control, the layback is enabled.

4.10.3.3 Diagram

The orientation of the survey vessel and the towfish are displayed in a two dimensional view. The diagram allows you to properly orient the lateral and axial layback for your current operating situation. A scale is displayed in the lower right corner of the diagram. The length of the vertical and horizontal lines of the scale is indicated in meters.

4.11 Range Delay

4.11.1 Overview

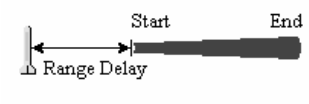

Figure 4-37 Range Delay

The Range Delay represents the distance, or "range," the *Sea Scan PC* is to wait, or "delay," before is starts to "look" at the acoustic returns. For example, if the range is 50 meters and the range delay is set to 7.5 meters, the sonar record line will record data that is in the range of 7.5 to 57.5 meters, as opposed to 0 to 50 meters. The range delay can be anywhere from 0 meters up to a distance equal to the current range. In other words, if the current range is 50 meters, the *Sea Scan PC* can be set to delay up to 50 meters.

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The most common use for the range delay is for water column removal. This is the process whereby the section of the sonar record that displays the acoustic returns as the sonar beam passes through the water column is removed. Typically, you are not interested in the acoustic returns as the sonar beam passes through the water column. Thus, set the range delay to the same distance as the towfish altitude to "ignore" any acoustic returns as the sonar beam passes through the water column. The *Sea Scan PC* will then start "looking" at the acoustic returns once the sonar beam has reached the range set by the range delay. In this case, this range is the seafloor. The other use for the range delay is to extend the view of the sonar, but for a specific range. For example, you want to look in the ranges of 75 to 175 meters and are not particularly interested in the first 75 meters. You would lose resolution using a range of 200 meters and you would be looking at everything from 0 to 200 meters. However, you can set the range to 100 meters and set the range delay at 75 meters. You will be able to look at the area of interest at a higher resolution, since you are using a shorter range.

4.11.2 Range Delay Dialog

The *Range Delay* dialog allows you to set the range delay graphically and set the altitude mode. Apart from the caption bar, the *Range Delay* dialog consists of: the: Range Delay Slider section; the Range Delay Mode Description section; and the Diagram section.

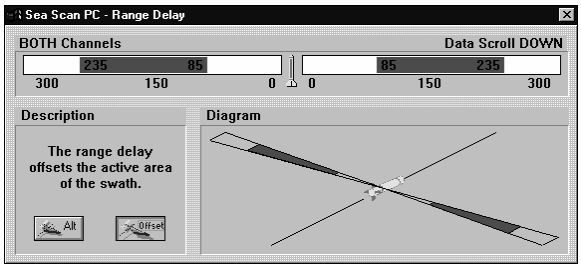

Figure 4-38 Range Delay Dialog

4.11.2.1 Range Delay Slider

The *Range Delay Slider* section allows you to set the range delay. The current geometry of the system is used to create a top-view of the towfish. The "active" area of the swath that is viewed is based on the current range and range delay. For example, if the data direction is set to scroll down, the towfish is visually represented pointing up. If the *Sea Scan PC* is set to use only the left channel at the 50-meter range, a 100-meter swath is displayed to the left of the towfish. A red bar is used to indicate the "active" area of the swath. The numbers on either end of the red bar indicate the extents of the "active" range. Using the above example, if the range delay is set to 7.5 meters the red bar will be offset to the left, and the "active" range is indicated as 7.5 to 57.5 meters on the appropriate ends of the red bar.

To adjust the range delay:

1. Place the cursor anywhere in the red bar and press the left mouse button. When both channels are in use, you can select the red bar for either channel.
2. Keeping the left mouse button pressed down, move the red bar to the desired range delay. Then release the left mouse button. When both channels are in use, the range delay is adjusted for both channels simultaneously. Both channels are always set to the same range delay. As the red bar is moved, the diagram, as described below, is continuously updated to reflect the new range delay setting.

4.11.2.2 Range Delay Mode

The range delay mode does not affect the data collection or viewing process. The range delay mode only affects the presentation of the swath coverage in the plotter and the calculation of markers along the length of the swath line. The estimated swath coverage is displayed differently in the plotter depending on the range delay mode. For water column removal, in "range delay equal to towfish

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altitude" mode the range delay is considered to be the towfish altitude. In this situation the start of the estimated swath coverage for both channels is directly below the towfish. Alternatively, in "swath offset" mode the range delay simply offsets the active area of the swath. In other words, the range delay extends your view out to the side. The start of the estimated swath coverage for both channels is offset from directly below the towfish by the range delay distance.

To set the range delay mode, select the corresponding button in the *Range Delay Mode Description* section. Only one range delay mode button may be pressed at any given time. Select the *Towfish Altitude* button so the range delay is "equal to the towfish altitude". The *Towfish Altitude* button will appear pressed and the *Swath Offset* button will appear raised. Select the *Swath Offset* button so the swath is "offset" by the range delay. The *Swath Offset* button will now appear pressed and the *Towfish Altitude* button will appear raised. In either case, the diagram, as described below, is updated to reflect the new altitude mode setting.

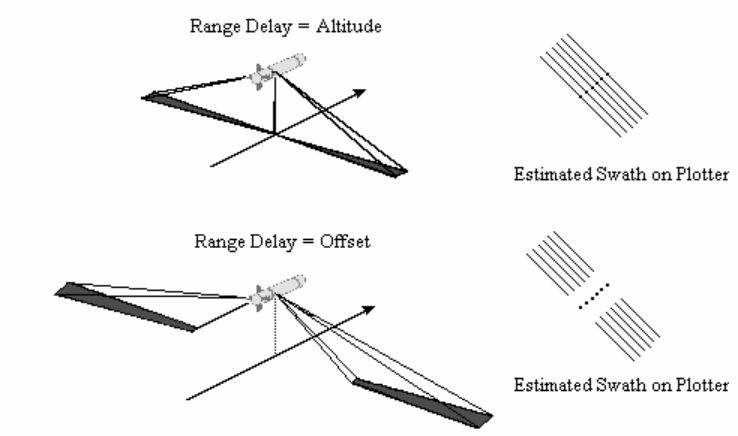

Figure 4-39 Range Delay Mode and Corresponding Plotter Interpretation

4.11.2.3 Diagram

The direction of the towfish, the swath coverage for selected channels and the range delay are displayed in a three dimensional view. The diagram allows for all the possible perspectives due to channel selection, data scrolling direction and range delay mode options. The active range of the possible swath is highlighted in red.

4.11.2.4 Displaying Range Delay Dialog

Select the *Range Delay* check box in the Sea Scan tool bar to display the *Range Delay* dialog. The *Range Delay* check box will appear pressed down and backlight with the color white.

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4.12 Length Measurement

4.12.1 Overview

The *Sea Scan PC* allows you to measure any feature in the sonar image data with the cursor. The length is presented as a transverse (vertical, along the direction of the towfish), an axial (horizontal, along the axis of the sonar beam), and a total length. The lengths are measured using the current length units. The range and ping separation distance for each sonar record line are sufficient to accurately calculate the length of features in the sonar record.

4.12.2 Factors Affecting Length Measurement

4.12.2.1 Apparent Speed-Over-Ground

Measuring the transverse length is completely dependent on the apparent speed-over-ground (SOG). The apparent SOG determines the ping separation distance. Typically, the apparent SOG matches the true SOG. In this situation the sonar image has a constant 1:1 aspect ratio, since the ping separation distances are valid. However, if the apparent and true SOGs were not matched, then the transverse length will not be accurate since the ping separation distance will not be accurate. The extent of the error depends entirely on the extent of the error between the apparent SOG and the true SOG. For example, if the apparent SOG is set at 3.6 knots and the true SOG is 4.0 knots, there is a 10% error. Thus, the ping separation distance will be off by 10% also. In fact, they will be 10% too short because the *Sea Scan PC* "thinks" it is only moving at 3.6 knots instead of the 4.0 knots it is actually moving. The *Sea Scan PC* will not be pinging fast enough to maintain the 1:1 aspect ratio for the sonar image. The undersampling will shorten features. Thus, when measuring the transverse length, a shortened feature will be 10% too short in the given example.

4.12.2.2 Range Delay

When measuring an object that is on both sides of the towfish, you must consider the effect of the range delay settings. Do not forget that the range is the distance from the towfish that the *Sea Scan PC* will display for both channels. This range may be "delayed" up to a distance equal to the range by setting the range delay. When a range delay has been set, the image on the screen has been "offset" from the towfish. Thus, when measuring objects that are on sonar lines that are "offset" in this manner, the *Sea Scan PC* must consider the distance of the "offset" in the length calculation.

The "offset" must be considered in two separate manners, depending on the range delay mode. As described in detail in **Range Delay Mode** 75, the range delay mode simply defines the manner in which the range delay is interpreted. When the range delay mode is set to "range delay equal to towfish altitude", the range delay is considered to be the altitude of the towfish. This interpretation of the range delay is used for water column removal. Thus, when measuring an object that is on both sides of the towfish, the range delay is not considered, since it is considered to be compensating for the towfish altitude. However, when the range delay mode is set to "swath offset", the range delay must be considered. The range delay is not considered to be compensating for the altitude and is included in the calculation of the length of an object when it is on both sides of the towfish.

Ultimately, it is easiest to measure the length of an object when it is completely on one side of the sonar record line. In this situation, the length calculation does not need to take into consideration the range delay.

4.12.3 Measuring Length

4.12.3.1 Overview

You can measure the length of any object on the screen using the cursor. A *Data Length* dialog is used to display the transverse, axial and total lengths.

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4.12.3.2 Displaying Data Length Dialog

Select the *Length* check box in the Sea Scan tool bar to display the *Data Length* dialog. The *Length* check box in the Sea Scan tool bar will appear pressed down and backlight with the color white. A small dialog appears that is used to display the transverse, axial and total length. If necessary, move the dialog so the feature you would like to measure is completely visible. The *Data Length* dialog consists of two sections: the Length Tool bar along the left side; and the length display section.

4.12.3.3 Length Display

The *Length* display section displays the axial, transverse, and total lengths in the current universal units. The latest measurement remains displayed until the *Data Length* dialog is removed or another length measurement is made.

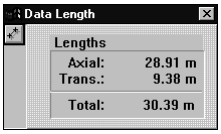

Figure 440 Data Length Dialog

4.12.3.4 Length Toolbar

The Length button in the Length Tool bar allows you to measure the length of a feature in the sonar image with the cursor.

1. Select the *Length* button in the Length tool bar. The cursor will change to the “length measurement” cursor.
2. Center the cursor over one end of the feature you would like to measure and press the left mouse button. If you attempt to initiate the length measurement process on an invalid line, a sonar record line that does not have an associated length, the process is aborted.
3. Keeping the left mouse button pressed down, move the mouse to the other end of the feature you would like to measure. The axial and transverse lengths indicate the relative vertical and horizontal distances, respectively, of the cursor from the initial position, as it is moved to the final position.
4. When at the final position, the other end of the feature you are measuring, release the left mouse button. The measured length will remain displayed until the *Data Length* dialog is removed or another length measurement is made.

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4.13 Object Height Measurement

4.13.1 Overview

It is possible to measure the height of a feature from the sonar image if there is discernible shadow behind the feature. Defining the geometry of the towfish, the object and the object's shadow allows the operator to measure the height of an object. The *Sea Scan PC* has automated this object height measurement process.

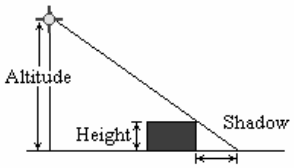

Figure 4-41 Object Height Calculation Orientation

There is an excellent discussion concerning sonar record interpretation, shadows and height measurement in *Sound Underwater Images: A Guide to the Generation and Interpretation of Side Scan Sonar Data*, by John P. Fish and H. Arnold Carr.

4.13.2 Factors Affecting Height Measurement

4.13.2.1 Transducer, Object and Object's Shadow Geometry

The object must cast a visible acoustic shadow. This may not occur in some situations, such as if the object is too close to the transducer. Furthermore, the end of the shadow must be visible on the sonar record line.

The height calculation assumes an ideal geometry. In other words, the acoustic path from the transducer to the top of the object to the end of the shadow is straight and the seafloor is level. The first assumption of a straight acoustic path is valid, considering that conditions were one sees the acoustic path "bend" are not common at the operating depths and ranges of the *Sea Scan PC*. However, the second assumption of a level seafloor is typically not valid. Thus, you must compensate based on your knowledge of level of the seafloor. The acoustic shadow for an object upslope of the transducer will be abnormally shortened. Similarly the acoustic shadow for an object down slope of the transducer will be abnormally lengthened.

4.13.2.2 Range Delay

The sampling for the sonar record line may be "delayed" up to a distance equal to the range by setting the range delay. When a range delay has been set, the image on the screen has been "offset" from the towfish. Thus, when measuring the height of an object that is on sonar lines that are "offset" in this manner, the *Sea Scan PC* must consider the distance of the "offset" in the height calculation. The "offset" must be considered in two separate manners, depending on the range delay mode. As described in **4.11.2.3 Range Delay Mode** (p. 4-53), the range delay mode simply defines the manner in which the range delay is interpreted. In either case it is best if the bottom is visible so the *Bottom* slider may be positioned accurately without having to make estimates based on the range delay mode.

When the range delay mode is set to "range delay equals towfish altitude", the range delay is considered to be the altitude of the towfish. This interpretation of the range delay is used for water column removal. Thus, when positioning the *Bottom* slider in the active range of the sonar data line, the range delay is included in the altitude measurement.

However, when the range delay mode is set to "swath offset", the range delay is not considered to be compensating for the altitude. Thus, when positioning the *Bottom* slider in the active range of the sonar data line, the range delay is not included in the altitude measurement.

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4.13.3 Height Measurement Dialog

4.13.3.1 Overview

The object height measurement is performed in the *Height Measurement* dialog. You select an object and then define the geometry for the height calculation. You can perform multiple calculations on the same sonar record line for objects that are stacked, such as a smaller object sitting on top of a larger object.

4.13.3.2 Display Height Measurement Dialog

Select the *Height* check box in the Sea Scan tool bar to display the *Height Measurement* dialog. The *Height* check box in the Sea Scan tool bar will appear pressed down and backlight with the color white. The cursor will change to the "line selection" cursor.

Although, typically, the object is visible on many transverse lines, select a single line that defines the object and the shadow well. Place the cursor on this preferred line. Then press and release the left mouse button without moving the cursor. The *Height Measurement* dialog will appear. The *Height Measurement* dialog consists of five sections: the B-mode view; the A-mode view; the Bottom, Object and Shadow sliders; the geometry and height calculation view; and the OK button.

4.13.3.3 B-Mode View

The B-Mode view section displays the selected line with neighboring sonar record lines in B-mode. The selected line is marked at either end of the image. This viewing mode provides a visual reference of the object and shadow that you should be familiar with. This is the same viewing mode that is used to display the sonar record lines in the data window. The pixel value along a horizontal line represents the intensity of the acoustic return at that position along the sonar record line. The B-mode view provides a general overview of the selected line when positioning the sliders for the height calculation.

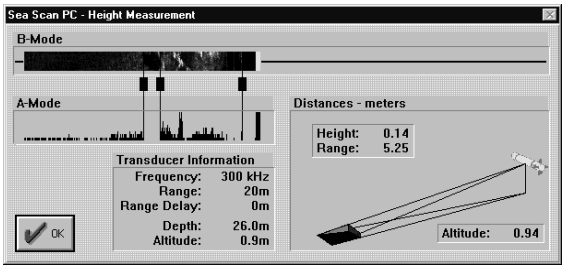

Figure 4-42 Object Height Measurement Dialog

4.13.3.4 A-Mode View

The A-Mode view section displays the selected line in A-mode. This viewing mode provides a visual reference of the acoustic returns on a single sonar record line. This "bar chart" view displays the acoustic return intensity in the vertical axis. The vertical lines along the horizontal axis represent the intensity of the acoustic returns at the respective positions along the sonar record line. In other words, a short vertical line represents a low intensity acoustic return. Likewise a long vertical line represents a high intensity acoustic return. The reflections from the seafloor and the object show up as long vertical lines (high intensity returns). The shadow is characterized by short or nonexistent vertical lines (low intensity returns). The A-mode view provides a specific view of the selected line for more precise positioning the sliders for the height calculation.

4.13.3.5 Bottom, Object, and Shadow Sliders

The three sliders allow you to define the geometry of the transducer, the object and the object's shadow for each particular circumstance. The *Bottom* slider, the one closest to the source

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(transducer), is placed at the bottom (seafloor) reflection. The *Object* slider, always in the middle, is placed at the object that is creating the shadow. The *Shadow* slider, the one furthest from the source, is placed at the end of the shadow. The two views, A-mode and B-mode, should enable you to place the sliders in the proper locations on the sonar record line. There are vertical lines attached to the sliders extending into both views to orient the sliders properly. As the sliders are moved, the geometry and height calculation view is continuously updated to reflect the new geometry.

4.13.3.6 Geometry and Height Calculation View

The geometry of the transducer, the object and the object's shadow, used for the height calculation, is displayed in a three dimensional view. The geometry view allows for all the possible perspectives due to channel selection and data scrolling direction and altitude mode options. The height and range of the object, based on the calculation from the presented geometry are displayed in this section. The altitude is also displayed so multiple calculations may be performed for stacked objects. The height, range and altitude are displayed in the current universal length units.

4.13.3.7 Transducer Information

The Transducer Information section displays information about the transducers such as the recorded frequency, range and range delay. A valid depth is displayed if the information is available from an external fathometer. The depth and altitude values are continuously updated as the *Bottom* slider is moved.

4.13.4 Measuring the Height of an Object

4.13.4.1 Single Calculation

1. Select a line where the object and shadow are well defined. In other words, the object and shadow are strongly visible and well delineated from the background. As described above, place the "line selection" cursor on this preferred line. Then press and release the left mouse button without moving the cursor.
2. The *Height Measurement* dialog will appear. The Bottom, Object and Shadow sliders have not been set. They are in starting default locations. You must place them depending on the specific situation.
3. Determine which slider is the *Bottom* slider. The *Bottom* slider is the closest one to the source, the transducer. It is not necessarily always on the left or right, since you may select an object from either side of the transducer. It will be on the same side of the *Height Measurement* dialog as the transducer in the Geometry view section. Place the cursor over the black box of the slider and press the left mouse button. Keeping the left mouse button pressed down, move the slider to the bottom reflection as seen in the A-mode and B-mode views. As the slider is moved, the geometry view and height calculation are continuously updated to reflect the new geometry.
4. Then, locate the *Object* slider. The *Object* slider is always in the middle, no matter the orientation of the other two sliders. Place the cursor over the black box of the slider and press the left mouse button. Keeping the left mouse button pressed down, move the slider to the point on the object that is causing the shadow as seen in the A-mode and B-mode views. As the slider is moved, the geometry view and height calculation are continuously updated to reflect the new geometry.
5. Finally, locate the *Shadow* slider. The *Shadow* slider is the furthest one from the source, the transducer. It is not necessarily always on the left or right, since you may select an object from either side of the transducer. It will be on the opposite side of the *Height Measurement* dialog of the transducer in the Geometry view section. Place the cursor over the black box of the slider and press the left mouse button. Keeping the left mouse button pressed down, move the slider to the end of the shadow as seen in the A-mode and B-mode views. The shadow will appear as low intensity returns. Typically, the end of the shadow can be seen when the acoustic intensities return to normal background levels. As the slider is moved, the geometry view and height calculation are continuously updated to reflect the new geometry.

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6. The height calculation process is completed. The height and range of the object are displayed in the universal length units.

4.13.4.2 Multiple Calculations

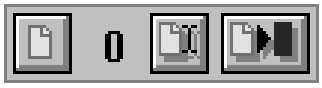
There are certain situations, such as when there are multiple objects, where a more complex height calculation is required. In many situations, drawing a simple diagram of the geometry of the towfish and the multiple objects will help determine the proper method to calculate the height of a specific object.

For example, an object, with a shadow, may be sitting on top of a larger base object, also with a shadow. You cannot use the same transducer altitude, as set by the *Bottom* slider, for both calculations since the top object is offset from the seafloor by the height of the base object. The height of the top object would be measured in the following manner:

1. Measure the height of the object that is situated on the seafloor, the base object. Use the method outlined above for a single calculation.
2. Record the height of the base object and the transducer altitude used for the calculation. The height of the base object is the distance the first object is above the seafloor.
3. Subtract the measured height of the base object from the transducer altitude to determine a valid transducer altitude for the height measurement of the top object. Now, move the *Bottom* slider back towards the source until the measured altitude, as displayed on the screen, is equal to the new valid transducer altitude you just calculated.
4. Place the *Object* and *Shadow* sliders in the proper position for measuring the height of the top object as outlined above for a single calculation.
5. The multiple height calculation process is completed. The height and range of the top object is displayed in the universal length units.

4.14 Annotations

4.14.1 Overview



To reference a specific feature in the sonar image you may add an annotation. The annotation feature allows you to attach a note on the sonar image much like one would attach a Post-It™ pad note on a hard-copy image. Any annotations attached to the sonar image, move with the image. Thus, once the location, at which the annotation has been attached, has scrolled off the end of the image buffer, the annotation disappears also. The annotations may also be removed manually and edited at any time. The annotations are marked on the sonar image with the annotation symbol. The display of the annotation symbols may be toggled on and off. The number of active annotations is displayed to the right of the *Toggle Annotation Display* check box. All active annotations are written to the data file when the sonar data is saved. Thus, the annotations may be reviewed and edited in the *Sea Scan PC Review* application.

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4.14.2 Adding an Annotation

4.14.2.1 Overview

An annotation may be placed anywhere on the sonar image. If necessary, scroll the sonar image so the feature of interest is visible. If the *Sea Scan PC* power is on, the image will continue to scroll throughout the annotation process. An *Add Annotation* dialog is used to simplify the creation of the annotation comment.

4.14.2.2 Display Add Annotation Dialog

Select the *Add Annotation* button in the Sea Scan tool bar to add an annotation to the sonar image. Alternatively, select the Annotations|Add menu item from the Options menu. The cursor will change to the "annotation" cursor. Center the cursor over the desired location, then press and release the left mouse button. The *Add Annotation* dialog is displayed. The dialog consists of three sections: the Comment Shortcut buttons along the left side; the Comment text; and then the OK and Cancel buttons along the right side.

4.14.2.3 Comment

The Comment section displays the current annotation comment. The comment may be any valid ASCII text. The comment is entered by either manually typing the text or using the shortcut buttons. Any text is entered at the current insertion point in the comment. The flashing vertical bar marks the insertion point.

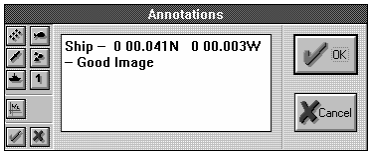
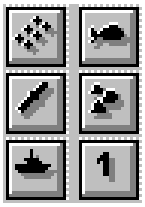


Figure 4-43 Add Annotation Dialog

4.14.2.4 Comment Shortcut Buttons

The *Comment Shortcut* buttons allow you to quickly enter default text into the comment section. When using the *Shortcut* buttons, a hyphen and spaces offset the default text when it is entered in the annotation comment. The hyphen and spaces keep the shortcut text entries separate and distinct from each other and any text that has already been typed in.



The first group, the *Identifier* buttons, is used to enter identification text in the annotation comment. Although only 6 *Identifier* buttons are visible in the *Add Annotations* dialog, you may select from a large list of possible *Identifier* buttons. In this example, the *Identifier* buttons are, from left to right and top to bottom: *Dockposts, Fish, Pipe, Rocks, Ship* and *Custom Text 1*. When the *Dockposts* button, in the upper-left corner, is pressed, "*Dockposts*" is entered at the insertion point in the annotation comment. Likewise, when the *Rocks* button in the middle-right is pressed, "*Rocks*" is entered at the insertion point. The *Custom Text 1* button in the bottom-right corner enters the text that has been associated with the *Custom Text 1* button. Please refer to **Customize_Annotation_Shortcuts** 85 for more information about setting the *Identifier* buttons and the custom annotation text.

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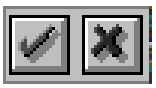
If the navigational information is available, the location at which the annotation has been attached will have an associated latitude and longitude. The *Latitude-Longitude* button places the latitude and longitude of the location in the annotation comment.



The last group, the *Qualifier* buttons, is used to enter qualifying statements in the annotation comment. When the *Checkmark* button, at the left, is pressed, "*Good Image*" is entered at the insertion point in the annotation comment. Alternatively, when the *X mark* button, at the right, is pressed, "*Poor Image*" is entered at the insertion point.

4.14.3 Editing and Removing an Annotation

4.14.3.1 Overview

An existing annotation may be edited or simply removed at any time. If necessary, scroll the sonar image so the desired annotation symbol is visible. It may also be necessary to toggle on the display of the annotation symbols. An *Edit Annotation* dialog, which is essentially identical to the *Add Annotation* dialog, is used to simplify the editing process. The only difference between the two dialogs is the addition of a *Remove* button in the *Edit Annotation* dialog.

4.14.3.2 Display Edit Annotation Dialog

To edit an annotation, double click on the annotation symbol in the sonar image. The *Edit Annotation* dialog for the selected annotation is displayed. Alternatively, select the *Edit Annotation* button in the Sea Scan tool bar, or select the Annotations|Edit menu item from the Options menu to edit an existing annotation in the sonar image. The cursor will change to the "annotation" cursor. Place the cursor close to the desired annotation symbol, then press and release the left mouse button.

The *Edit Annotation* dialog is displayed. The annotation comment of the selected annotation is displayed in the Comment text section. The dialog is identical to the *Add Annotation* dialog, except for the addition of the *Remove* button.

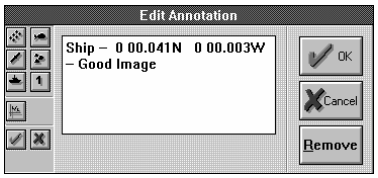


Figure 4-44 Edit Annotation Dialog

4.14.4 Displaying Annotation Symbols

Select the *Show Annotations* check box to display the annotation symbols in the sonar image. The annotation symbols are overlaid on the sonar image, indicating their location. When selected, the check box will appear pressed down. Alternatively, select the Annotations|Show menu item from the Options menu. When selected a check mark will appear to the left of the menu item. To hide the annotation symbols either select the *Show Annotations* check box again or select the Annotations|Show menu item in the Options menu again. The number of active annotations is always displayed to the right of the *Show Annotations* check box. Thus, you can monitor the number of active annotations even when the annotation symbols are not displayed in the sonar image.

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4.14.5 Customize Annotation Shortcuts

4.14.5.1 Overview

This dialog allows you to modify the selection of *Identifier* buttons in both the *Add* and *Edit Annotation* dialogs. You may also edit the entry text of up to six custom *Identifier* buttons.

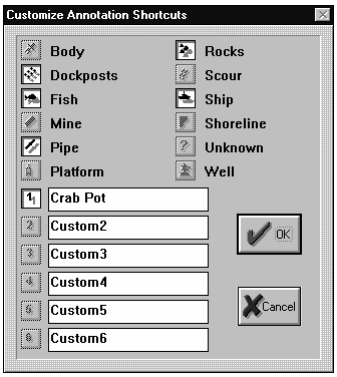

Figure 4-45 Customize Annotation Shortcuts Dialog

4.14.5.2 Setting Active Identifier Buttons

The *Identifier* buttons in the *Add* and *Edit Annotation* dialogs are used to enter identification text in the annotation comment. As indicated earlier in this section, although only six *Identifier* buttons are visible at a time, you may select from a large list of possible *Identifier* buttons.

The possible *Identifier* buttons and their associated text are displayed in this dialog. Select the icon to include the item as one of the six visible *Identifier* buttons. The button will appear pressed indicating that it has been selected as one of the six *Identifier* buttons. You cannot select more than six *Identifier* buttons. As soon as six *Identifier* buttons have been selected, the rest of the buttons will appear dimmed. In order to change your selection, simply press a selected button a second time. The button will now appear raised, indicating it is not selected as one of the six *Identifier* buttons.

Save the selection of *Identifier* buttons by clicking the *OK* button or hitting Return. The new selection of *Identifier* buttons is now valid and any time the *Add* or *Edit Annotation* dialog is displayed, this newly selected list of *Identifier* buttons will be displayed. Alternatively, cancel the new selection of *Identifier* buttons by pressing the *Cancel* button. Any changes to the original selection of *Identifier* buttons will be ignored.

4.14.5.3 Setting Custom Text

There are six possible custom *Identifier* buttons. Each of the six custom *Identifier* buttons has customizable text associated with the button. This text is entered in the annotation comment when the associated custom *Identifier* button is pressed in either the *Add* or *Edit Annotation* dialogs. To include custom text as an *Identifier* button option, simply select one of the custom *Identifier* buttons as one of the six visible *Identifier* buttons. Then type the custom text you would like associated with this custom *Identifier* button.

4.15 Saving Data

4.15.1 Overview

The sonar image data may be saved to disk. The data filename and default directory are set automatically each time the *Sea Scan PC* is started. A default directory is created in the *SSPCDATA*

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directory of the active drive (typically *C:* or *D:*) based on the current date. For example, on October 14th, a subdirectory called *14OCT* will be created in the *SSPCDATA* directory and all data for that day is automatically stored in this directory. This subdirectory name is also used as the default filename for all data files for that day. When you save the image data, a suffix is automatically added to the default filename and the data file is stored in the default directory. The first suffix is numbered *000* and the suffix for each successive file is incremented by one. For example, for a base filename *14OCT*, successive files would be named *14OCT000.MST*, *14OCT001.MST*, *14OCT002.MST*, etc. If a filename, such as *14OCT000.MST* already exists, the next available suffix is used automatically. An existing data file will not be overwritten.

Saving the data to disk does not interrupt the data collection process. While the data is stored to disk, the *Sea Scan PC* will continue to collect incoming sonar image data and navigational information in the background. Once the data storage process is completed, the new navigational information and sonar image data will be displayed. If the user option is enabled, a dialog is displayed while the data is being written to disk. The dialog displays the name and directory of the new data file, the resolution and compression mode, and it contains a thermometer that allows you to monitor the progress of the data storage process. Condensed images of the image buffer and the current and survey plotters are also displayed for your reference in the dialog.

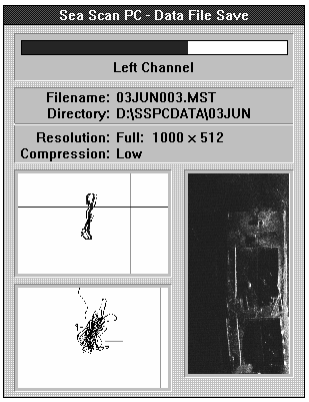

Figure 4-46 Data File Save Dialog

Saving the data to disk will write the contents of the image buffer, using the currently selected resolution. The settings for each line such as the range and range delay are stored with the sonar image data. All the markers and waypoints from the Sea Scan plotter, the latest navigational information 'packets' that define the ship's track, an image of the survey plotter and a preview image of the data are also written to the disk. All the *Sea Scan PC* data files use the *.mst* extension so they can be properly identified by the *Sea Scan PC Review* application. Please refer to **Sea Scan PC Files - Image Data File** 167 for the *Sea Scan PC* data file format. The data files may be read by the *Sea Scan PC Review* application for further analysis and review.

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4.15.2 Setting Express Save Settings

Select the Settings | Express Save… menu item in the Options menu to set the express save settings. The *Express Save Settings* dialog is displayed. This dialog allows you to override the automatic express save settings.

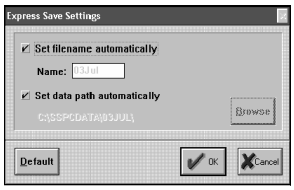

Figure 4-47 Express Save Settings Dialog

To enter a custom file name you must uncheck the *Set Filename Automatically* check box. When the box is not checked the Name entry box will be enabled (not grayed out) and you can enter valid default name. The default name must not be more than 5 characters and must form a valid filename when appended with a three-digit number and the *.mst* extension. To have Sea Scan PC automatically choose a name for your files, simply check the *Set Filename Automatically* check box.

To enter a custom data path you must uncheck the *Set Data Path Automatically* check box. When the box is not checked the *Data Path* below it will be enabled (not grayed out). When the *Data Path* is enabled you may now enter a valid default directory. The new directory must already exist. You will be notified if either of the entries is invalid.

Select the *Browse* button to browse the computer's file system for a new default directory and default filename. The *Select Express Directory and Name* dialog will appear. Navigate through the computer's file system to select a default directory. Enter a 5-character name in the *File name* field to set the default filename. Any filename entered in the *File name* field will be automatically truncated to five characters.
Select the new default directory and filename by clicking the *OK* button or hitting Return. You will be returned to the *Express Save Settings* dialog and the new default filename and directory will be entered in the fields. To have Sea Scan PC automatically choose a *Data Path*, simply check the *Set Data path Automatically* check box.

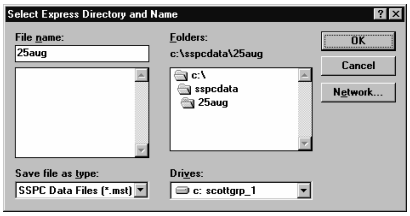

Figure 4-48 Select Express Directory and Name Dialog

Save the new express save settings by clicking the *OK* button or hitting Return. The new express save settings will now be used every time the sonar data is written to disk. Alternatively, cancel the new express save settings by pressing the *Cancel* button. Any changes to the original express save settings will be ignored.

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4.15.3 Express Save

Select the *Express Save* button in the Sea Scan toolbar to save the sonar image data. The *Express Save* button allows you to save a *Sea Scan PC .mst* data file very quickly. Alternatively, select the Save menu item from the File menu to save the data. In either case, a *Sea Scan PC .mst* data file is named automatically and written to the default directory. The data storage can be monitored with the *Data Storage Status* dialog. Refer to **Monitoring Data Storage** 89 for more information about monitoring the data storage.

4.15.4 Automatic Save

You can store the sonar data to disk automatically. Thus, an entire survey can be stored without losing any information. New data files, using the express save settings, will be created automatically based on the data storage settings. If you enable the automatic save option, it is highly recommended that you have enough disk space for the resulting amount of data files that will be stored. Refer to **Monitoring Data Storage** 89 for more information about monitoring the data storage.

4.15.5 Data Storage Settings

4.15.5.1 Overview

The sonar data can be written to disk using a variety of channel resolution and compression modes. The channel resolution mode dictates the amount of the raw data, the 1000 line Image Buffer for each channel, written to disk. The compression mode dictates the level of compression the raw data undergoes when it is written to disk. Typically, the higher the channel resolution and compression, the longer it takes to save the sonar data to disk. As expected, the lower the channel resolution and compression, the faster it takes to save the data. The sonar data can also be saved automatically with a user selectable overlap between the data files.

4.15.5.2 Setting Data Storage Parameters

Select the Settings|Data Storage… menu item in the Options menu to set the data storage settings. The *Data Storage Settings* dialog is displayed. The dialog consists of two sections: the Automatic Save Settings section and the Channel Resolution section. To select an option, place the cursor on the corresponding radio button, then press and release the left mouse button. The selected radio button will now appear marked and the previously selected radio button will be cleared. Only one radio button for each group may be selected at any time.

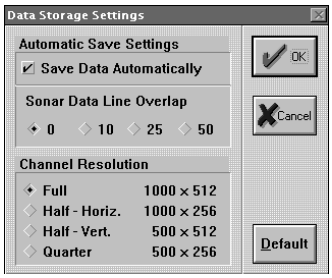

Figure 4-49 Data Storage Settings Dialog

Automatic Save Settings

Enable the automatic save option by selecting the *Save Data Automatically* check box. A check mark will appear in the check box when the option is enabled. You can also set the amount of sonar data line overlap for each data file. The overlap indicates the number of sonar data lines that are duplicated for each data file. This feature is useful for traditional cut-and-paste mosaic techniques. The overlap allows the data files to be "pasted" together more easily. For more modern GIS-based mosaics you do not want any overlap between the data files. When the automatic save option is enabled a new data file, using the Express Save parameters, will be created for every successive 1000 lines of sonar data

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minus the overlap.

Channel Resolution

The channel resolution mode dictates the amount of the raw data written to disk. The sonar image data, the raw data, consists of the 1000 line image buffer. Each horizontal line in the image buffer contains 512 pixels for each channel. Thus, for each channel, the raw data can be thought of as a 1000 (vertical) by 512 (horizontal) pixel image. In *Full* resolution mode, the entire 1000 x 512 pixel image for each channel is written to disk. In *Half-Horiz* mode, a 1000 x 256 image for each channel, the full vertical resolution and half of the horizontal resolution, is written to disk. Every other pixel along each horizontal line in the 1000 line image buffer is skipped when the data is written to disk. In fact, adjacent pixels are compared and the pixel with the highest intensity is written in place of the two adjacent pixels. This ensures that no information in the raw data is lost. This saves half of the storage space normally required for the full resolution image. However, you will lose half of your axial (horizontal) resolution in the stored data file. Similarly, in *Half-Vert* mode, a 500 x 512 image for each channel, half of the vertical resolution and the full horizontal resolution, is written to disk. Every other vertical line in the 1000 line image buffer is skipped when the data is written to disk. Similar to the *Half-Horiz* mode, this mode saves half of the storage space normally required for the full resolution image. However, you will lose half of your transverse (vertical) resolution in the stored data file. In *Quarter* mode, a 500 x 256 image for each channel, half of the vertical resolution and half of the horizontal resolution, is written to disk. Every other vertical line in the 1000 line image buffer and every other pixel along each of the horizontal lines are skipped when the data is written to disk. This saves three-quarters of the storage space normally required for the full resolution image. However, you will lose half of your axial (horizontal) resolution and half of your transverse (vertical) resolution in the stored data file.

NOTE: It is recommended that the Full resolution mode be used at all times. The lower resolution modes were originally offered at a time when massive storage space was not available on computers. The operator could sacrifice resolution to maximize storage capability. However, given the massive storage capabilities currently available on modern computers the Full resolution mode should be used at all times.

4.15.5.3 Monitoring Data Storage

You may monitor the data storage by selecting the Status Boxes|Data Storage menu item from the Options menu. This menu command toggles the display of the *Data Storage Status* dialog. The dialog may be moved anywhere on the screen. When the dialog is removed, its position is remembered for the next time the dialog is displayed. The *Data Storage Status* dialog consists of four distinct sections: Last Filename; Express Save Settings; Storage Status; and Storage Parameters.

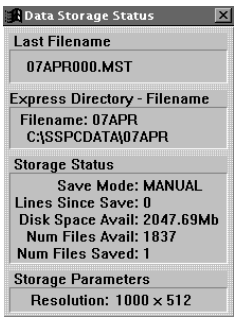

Figure 4-50 Data Storage Status dialog

Last Filename

This section displays the filename of the latest data file saved to disk. A N/A entry indicates that a data file has not been created yet.

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Express Save Settings

Filename

This line states the default filename. This is the same filename displayed to the right of the *Express Save* check box in the Sea Scan tool bar. When the image data is saved using the express save option the filename is created automatically by adding a unique suffix to this default filename.

Pathname

This line states the full pathname of the selected destination directory. Typically, the entire pathname cannot fit, so only the drive letter and the last directory name appear on the line.

Storage Status

Save Mode

This line states whether the default save mode is *Manual* or *Automatic*. In automatic mode the number of lines that trigger the save operation is appended to the mode indicator. For example, with a 25 line overlap the indicator is displayed as *AUTO-975*. This indicates that the automatic save operation will occur every 975 lines.

Lines Since Save

This line displays the number of sonar record lines that have been recorded since the last file was saved. This number is incremented every time a sonar record line is processed and displayed. Recall that the image buffer can contain the last 1000 lines, thus when this value exceeds this upper limit of 1000 sonar record lines, data that has not been saved is lost. If the automatic save option is enabled, the data will be stored to disk automatically when this number reaches 1000 minus the overlap.

Disk Space Avail

This line displays the disk space, in terms of bytes, that is available on the default drive. The default drive is the drive specified by the express save settings.

Num. Files Avail

This line displays the disk space that is available on the default drive in terms of the number of Sea Scan data files that can fit. The approximate size of a full resolution data file is used to determine the number of files that can fit. The default drive is the drive specified by the express save settings.

Num. Files Saved

This line displays the number of Sea Scan data files that have been saved since the *Sea Scan PC* application was last started.

Storage Parameters

Resolution

This line states the channel resolution mode used when saving the sonar data to disk. The channel resolution is expressed as the number of vertical and then horizontal pixels for each sonar channel. The *Full*, *Half-Horiz*, *Half-Vert* and *Quarter* resolution modes are expressed as 1000 x 512, 1000 x 256, 500 x 512 and 500 x 256 respectively.

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4.16 Archive Files

4.16.1 Survey Files

4.16.1.1 Overview

Survey files are simple ASCII text files that contain a continuous log of selectable information from the external devices and possibly data storage activity. In the main survey file each line is triggered by the incoming navigational information. Information from the other external devices and the sonar parameters are included with each navigation event record. By default the main survey file uses the *.svy* extension. In fathometer survey files, each line is triggered by the incoming fathometer information. By default the fathometer survey file uses the *.dpt* extension. In magnetometer survey files, each line is triggered by the incoming magnetometer information. By default the magnetometer survey file uses the *.mag* extension. The format of the survey files is described in detail in **Survey File** 170.

4.16.1.2 Creating a Survey File

The survey files are created automatically each time the *Sea Scan PC* application is started. All of the subsequent sonar, navigation, fathometer and magnetometer information is written to the survey file. The data storage information is also written to the main survey file. As a result, you will be able to completely recreate the survey based on the stored information in the main survey.

You cannot append to an existing survey file from within the *Sea Scan PC* program. A unique filename is created every time a survey file is created. Since the files are simple ASCII text files, you can merge related survey files using a text editor. However, you must be certain the time correlation information is the same for both survey files. The time correlation information will not be the same if Windows has been restarted in between the creation of two survey files.

4.16.1.3 Setting Survey File Settings

Select the Settings|Survey File… menu item in the Options menu to set the survey file settings. The *Survey File Options* dialog is displayed. The dialog consists of eight sections: the Files section, Timestamp section; Navigational Input section; Operations section; Side Scan Parameters section; Fathometer Parameters section; Magnetometer Parameters section; and the File Format section. There are a number of items that are required, such as the *System Time* and *Position*. To enable an optional item, place the cursor on the corresponding check box, then press and release the left mouse button. A check mark will appear in the check box when the item is enabled.

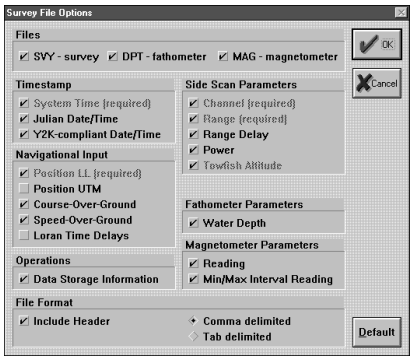

Figure 4-51 Survey File Options

Files

This section lists the three possible survey files: main, fathometer and magnetometer. To enable a specific survey file, place the cursor on the corresponding check box, then press and release the left mouse button. A check mark will appear in the check box when the survey file is enabled. The corresponding survey file will be created if the check box has been checked.

Timestamp

The *Sea Scan PC* can include a number of different timestamps for each event in the survey file. The *System Time* is a required field. Each of these timestamps are described in detail in **Navigational**

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and External Information - Timestamp 171.

Navigational Input

The *Position (LL)* is a required field. The *Loran Time Delays* are only relevant if you are using a Loran C positioning system. Otherwise, the *Loran Time Delays* option should not be selected.

Operations

When this item is enabled, the data storage information is inserted in the main survey file. This information allows you to determine when and where a data file was saved. Each data storage information section consists of a set of 4 lines. The data file's pathname, version and begin and end system times for the sonar data are recorded. It should be noted that the sonar image data is not stored in the main survey file. However, a reference to the sonar data file is entered which would allow a survey file reader to locate the sonar image data.

Side Scan Parameters

The *Channel* and *Range* fields are required. The side scan parameters allow you to determine the state of the sonar during the data collection process.

Fathometer Parameters

If an external fathometer is available, the incoming water depth may be logged in the main survey file. The fathometer information is likely arriving asynchronously with the navigational information, thus the most current water depth is recorded.

A separate fathometer archive file is created when the *DPT – fathometer* survey file has is selected. This separate survey file is a continuous log of all the fathometer information from the external fathometer device. See **Fathometer Survey File** 173 for more information about the fathometer survey file.

Magnetometer Parameters

If an external magnetometer is available, the incoming magnetic field readings may be logged in the survey file. The magnetometer information is arriving asynchronously and at a much faster rate than the navigational information, thus only the most current magnetic field reading is recorded. The minimum and maximum readings in the interval since the last survey file record are also recorded. The minimum and maximum readings will indicate the level of activity in the time between survey file records.

A separate magnetometer archive file is created when the *MAG – magnetometer* survey file is selected. This separate survey file is a continuous log of all the magnetometer information from the external magnetometer device. See **Magnetometer Survey File** 174 for more information about the magnetometer survey file.

File Format

An optional header can be included in the survey files. The header contains information about the survey file that may be of interest. See the relevant sections in **Survey File** 170 for more information about the individual survey file headers. Either a comma or a tab character can separate the items on each line in the survey files. Indicate the desired delimiter by selecting the corresponding radio button.

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4.16.1.3.1 Monitoring Survey File

Select the Status Boxes|Survey File menu item from the Options menu to monitor the status of the survey files. This menu command displays a *Survey File Status* dialog that displays the survey files' current parameters and status. To remove the *Survey File Status* dialog, select the Status Boxes|Survey File menu item from the Options menu again. Each survey file section consists of two sections: Survey File Path; and Survey File Information.

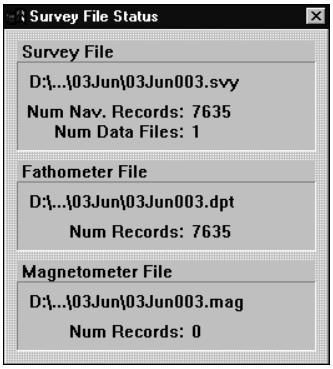

Figure 4-52 Survey File Status Box

Survey File

This section displays the storage information for the main survey file. The abbreviated pathname to the survey file is listed. Furthermore, the numbers of navigational records and data files that have been recorded in the current survey file are also listed.

Fathometer File

This section displays the storage information for the fathometer survey file. The abbreviated pathname to the fathometer survey file is listed. Furthermore, the numbers of fathometer readings that have been recorded in the current file are also listed.

Magnetometer File

This section displays the storage information for the magnetometer survey file. The abbreviated pathname to the magnetometer survey file is listed. Furthermore, the numbers of magnetometer readings that have been recorded in the current file are also listed.

4.16.2 Marker File

4.16.2.1 Overview

The marker file is a simple ASCII text file that contains a continuous log of all the markers and waypoints that are created during a survey. By default the marker file uses the *.mkr* extension. The format of the marker file is described in detail in **Marker/Waypoint Data File** 168.

4.16.2.2 Creating Marker File

A marker file is created automatically each time the *Sea Scan PC* application is started. All of the marker and waypoint information is written to the marker file. As a result, you will have a complete list of all the markers and waypoints created during a survey automatically.

You cannot append to an existing marker file from within the *Sea Scan PC* program. A unique filename is created every time a marker file is created. Since the files are simple ASCII text files, you can merge related marker files using a text editor. However, you must be certain the time correlation information is the same for both files. This will be the case for two or more marker files that have been created if Windows has not been restarted in between.

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4.17 Training Mode

4.17.1 Overview

This chapter describes the training mode for the *Sea Scan PC* application. The training mode is identical to the active mode, except it does not collect real data, nor does it accept information from any of the external devices. The sonar record line data and the information from the external devices are simulated. The training mode allows you to familiarize yourself with the basics of the *Sea Scan PC* without having to be actually collecting real data. Every process, including gain control and the testing of the serial communications, is rigorously simulated. The transducers and the external devices do not have to be connected.

4.17.2 Simulated Sonar Data

In training mode, the program simulates the sonar record data. In an attempt to show movement over the seafloor a continuous "virtual" bottom has been created.

The "virtual" seafloor consists of a slightly sloped bottom increasing in slope from the east to the west. This sloping bottom results in an increasingly greater acoustic return, as recorded on the sonar record line, when the sonar beam is looking to the west, since it is looking upslope.

More significantly, there is a large patch of symmetric sand ripples. They appear every four meters and are oriented in a north-south direction. The sand ripples are confined to a 1600 x 1600 meter area. The edges of the square-shaped area run along the north-south and east-west directions. The lower left corner is located 100 meters to the west and south of the intersection of the prime meridian and the equator. Along each sonar record line, the acoustic response from the consecutive symmetric sand ripples appears as a saw tooth pattern. The acoustic response increases quickly on the facing slope and then diminishes slowly along the backside of the sand ripple. There is a high-intensity band through this patch of sand ripples. This band simulates a change in the bottom geology.

The data for every sonar record line depends on the current position and heading. For every ping, the current position and heading are used to determine what the transducers "see" on the "virtual" bottom. Since, there may be multiple pings between each update from the simulated GPS, the current position is extrapolated from the last valid position, using the last valid heading and the apparent SOG. This extrapolation between navigational information updates may cause some distortion when using a high ping rate (short range and fast apparent speed).

4.17.3 Switching to Training Mode

By default, you will always start the *Sea Scan PC* program in active mode, the normal operating mode. Select the Mode menu item in the Options menu to change to the training mode. A pop-up menu will appear. The current mode, either active or training mode, is marked with a check mark. Select the menu item Training from the Mode pop-up menu. The *Sea Scan PC* will be switched to training mode. When in training mode, the word ---- *TRAINING* ---- is displayed on either side of the application name in the caption bar.

Any data in the image buffer is cleared, information from the external devices is cleared and the Sea Scan plotter is reset. Thus, any data that exists will be lost. If you do not want to lose any existing data, or any real information from the external devices before switching to training mode, save the sonar image file first.

The display parameters, such as the color scale and data scrolling direction, are not changed. However, the Sea Scan plotter parameters are modified. The bounds for both the current and survey plotters are changed so the simulated vessel's track will be properly displayed.

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4.17.4 Switching to Active Mode

You can switch back to active mode at any time by selecting the Mode menu item in the Options. A pop-up menu will appear. Select the menu item Active from the Mode pop-up menu. The *Sea Scan PC* will be switched back to active mode. The word ---- *TRAINING* ---- is removed from either side of the application name in the caption bar.

Any simulated data in the image buffer is cleared, the simulated information from the external devices is cleared and the Sea Scan plotter is reset. Both the current and survey plotters are reset to their previous settings. None of the previous sonar data or external device information from before the *Sea Scan PC* was switched to training mode is available.

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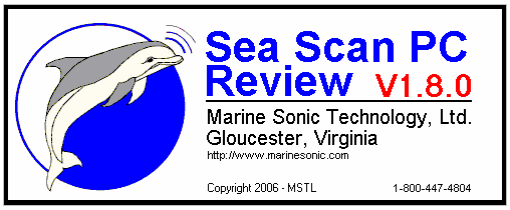
Section 5

- **Sea Scan PC Review**

5 Sea Scan PC Review

5.1 Overview

This chapter describes the operation of the *Sea Scan PC Review* application. Detailed subsections outlining the various features of the *Sea Scan PC Review* application follow a brief overview. Many of the *Sea Scan PC Review* features are identical to their counterparts in the *Sea Scan PC* program. These features and controls will be briefly described and you are referred to the relevant chapter for the feature in the *Sea Scan PC* description. However, features specific to the *Sea Scan PC Review* program will be explained in full detail.



The *Sea Scan PC Review* application allows you to review and process saved image files. The image buffer is displayed on the screen in the same format as the *Sea Scan PC* display screen. Most of the *Sea Scan PC Review* features, such as the Sea Scan plotter and the plotter-sonar image interaction, are identical to the *Sea Scan PC* features. The real-time features, for obvious reasons, are not present in the *Sea Scan PC Review* program.

The *Sea Scan PC Review* application is started from the Windows desktop by double clicking on the *Sea Scan PC Review* icon. Alternatively, you may simply double click on a *Sea Scan PC* data file, with the required *.mst* extension name. The *Sea Scan PC Review* program will be started automatically and loaded with the selected data file. You may also take advantage of the Window's drag and drop capability. Drag a valid *Sea Scan PC* data file onto the *Sea Scan PC Review* icon. Upon releasing the mouse button, the *Sea Scan PC Review* program will be started automatically and loaded with the selected data file.

The *Sea Scan PC Review* application may be configured with different display parameters. These display parameters are saved in an initialization file, *ssreview.ini*. The display parameters are displayed graphically in the Sea Scan tool bar and the information window.

Although each feature is described in detail in the following chapters, the easiest method to learn the *Sea Scan PC Review* application is to try it. We recommend you try the *Sea Scan PC Review* application using one of the provided sample data files to get you started.

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5.2 Screen Layout

5.2.1 Overview

The Sea Scan screen may be divided into functional sections: the Menu bar; the Sea Scan tool bar; the information window; and finally the data window.

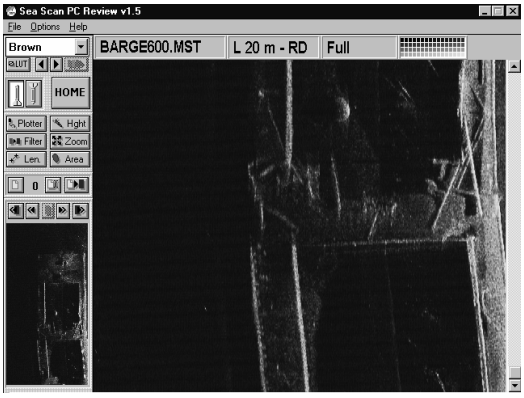


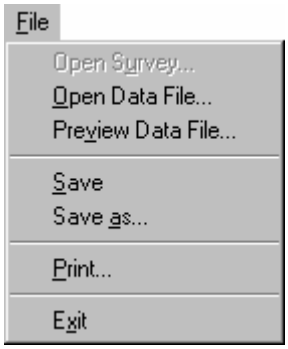
Figure 5-1 Sea Scan PC Review Screen Layout

5.2.2 Menu Bar

The menu bar is located directly below the caption bar. It contains the menus for use with the *Sea Scan PC Review* application.

5.2.2.1 File menu

The File menu allows you to perform system functions that are not directly related to viewing the sonar image.



Open Survey...

This command is currently not available. In future versions of the *Sea Scan PC Review*, it will allow you to open a main survey file. This feature is intended to allow you to review an entire survey as a group, instead of just reviewing single data files.

Open Data File...

This command allows you to open a *Sea Scan PC* data file. You will be prompted by the *Open SSPC Data File* dialog to select a valid *Sea Scan PC* data file. Upon selection of a valid *Sea Scan PC* data file, a *Sea Scan PC – Data File Open* dialog is displayed informing you that a file is now being read into the *Sea Scan PC Review* program. The dialog contains a thermometer that allows you to monitor the progress of the data reading process. Information about the data file, including a condensed image and the survey plotter, is also displayed for your reference in the dialog.

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Preview Data File...

This command allows you to preview the sonar image and the survey plotter of a *Sea Scan PC* data file without having to actually open the data file. You will be prompted by the *Select SSPC Data File for PREVIEW* dialog to select a valid *Sea Scan PC* data file. Upon selection of a valid *Sea Scan PC* data file, the *Sea Scan PC - Date File Preview* dialog is displayed. The dialog displays a summary of the file information, such as the filename and directory, the date it was stored and the resolution and compression modes. A condensed image and the survey plotter are also displayed for your reference. The beginning text of any annotations present in the sonar image is displayed also. At this point you may either: cancel the operation; preview another data file; or open the selected data file. If you chose to select another data file, the above process is repeated.

Save

This command allows you to resave the currently opened data file. The existing filename is used automatically, thus the old data file is written over by the any changes in the opened data file.

Save As...

This command allows you to save the currently opened data file with a new filename. Alternatively, you can save the sonar image as a TIFF file. TIFF is a standard file format for images, thus allowing the image to be read by most third-party image processing applications and word processors. You will be prompted to name the file and select a location. Furthermore, you can choose to remove the navigational information from the data file. For more information on saving the data please refer to **Saving Data** 131.

Print...

This command allows you to print the sonar image and the current and survey plotters. A *Sea Scan PC – Print* dialog will allow you to customize the printing options before the image is actually printed. You may also preview the printed pages based on your selected printing options. For more information on printing please refer to **Printing Data** 134.

Exit

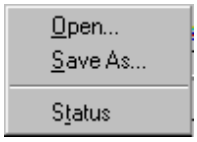
This command exits the *Sea Scan PC Review* application and returns you to the Windows desktop.

5.2.2.2 Options Menu

The Options menu allows you to perform functions that are related to the display, processing and storage of the sonar data.

Markers

This command displays a pop-up menu of marker commands. This pop-up menu allows you to read and write a *.mkr* file. You can also toggle the display of the *Marker Information* dialog. The marker handling process is described in detail in **Marker Lists** 115.



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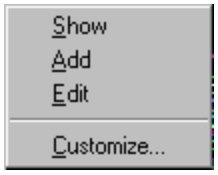
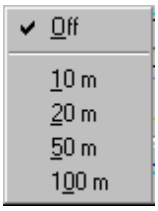
Annotations



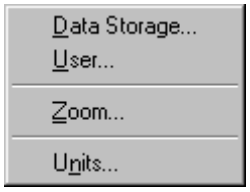
This command displays a pop-up menu of annotation commands. This pop-up menu allows you to toggle the display of the annotations, add new annotations, edit existing annotations and customize the annotation *Comment Shortcut* buttons. The annotation process is described in detail in **Annotations** 82.

Range Marker



Range markers are also called scale lines since they are scale reference lines displayed in the sonar image. This command displays a list of possible ranges for the range markers. The current range marker setting is indicated with a check mark. Range markers are placed over the sonar image at the designated interval to provide a quick visual cue for range from the towfish. For example, if you have selected 20 meters as the range interval, the range markers will be placed over both channels of the sonar image data every 20 meters. They are displayed in an intermittent format. The range markers are displayed for 30 lines and then skipped for 50 lines. The intermittent display results in a vertical dashed line marking the selected range interval.

Settings



This command displays a pop-up menu that allows you to set specific settings related to the *Sea Scan PC Review* operation.

Data Storage

This command displays a dialog that enables you to set the data storage parameters. The channel resolution and compression factor may be adjusted depending on the operating preference. The data storage parameters are described in detail in **Data Storage Parameters** 131.

User

This command displays a dialog that enables you to set various user options. The shutdown, runtime, and data modification alert options may be adjusted depending on the operating preference. The user options are described in detail in **User Parameters** 103.

Zoom

This command displays a dialog that enables you to set various zoom options. The default zoom size and default path for the automatic GIF storage directory may be set depending on the operating preference. The zoom options are described in detail in **Zoom** 118.

Units

This command displays a dialog that enables you to set the length, speed and location units. A consistent set of units is used throughout the application. The units are described in detail in **Units** 34.

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Group Review

This command allows you to perform automated group review operations on an entire data set from a survey. The group review operations are described in detail in **Group Review** 132.

Group Review Status

This command toggles the display of the *Group Review* dialog. This dialog displays the status information for the group review operation. The group review operations are described in detail in **Group Review** 132.

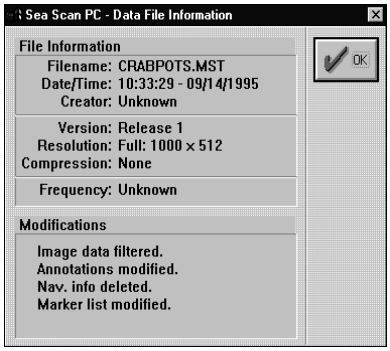


Figure 5-2 Data File Information Dialog

File Information

This command displays the *Sea Scan PC – Data File Information* dialog that lists the file information for the currently opened data file. The complete filename, the date and time the data file was originally stored, the creator application, the file version and the resolution, compression modes and frequency are displayed. Any modifications to the data file, such as having been filtered, are listed. To remove the dialog, select the *OK* button or hit Return.

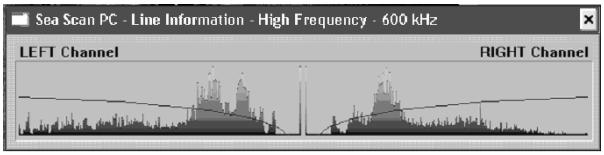


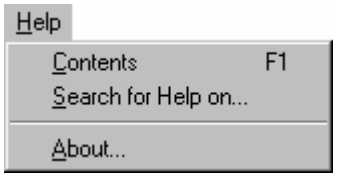
Figure 5-3 Line Information Dialog

Line Information

This command toggles the display of the *Sea Scan PC – Line Information – Gain* dialog. This dialog displays the acoustic intensity information in A-mode, corresponding gain values, and the transducer frequency for the current line. The cursor is used to select the current line. The contents of the dialog are updated continuously as the cursor moves over the sonar image data.

5.2.2.3 Help Menu

The Help menu allows you to access the on-line help for the *Sea Scan PC Review* application and the *About* dialog.



Contents

This command displays the Contents page of the *Sea Scan PC Review* on-line help. This is a good starting page to find general help about the application. . This menu item is disabled if the *Sea Scan PC Review* on-line help does not exist.

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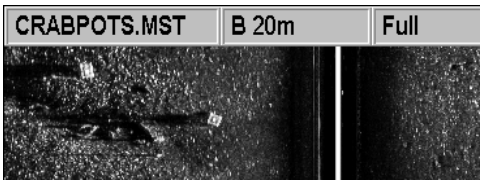
Search for Help on...

This command displays the *Search* dialog for the *Sea Scan PC Review* on-line help. This dialog allows you to search for keywords in the on-line help. This menu item is disabled if the *Sea Scan PC Review* on-line help does not exist.

About...

This command displays the *About* dialog for the *Sea Scan PC Review* application. To remove the *About* dialog, press the *OK* button.

5.2.3 Information Window



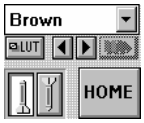
The information window is located directly below the menu bar. It displays the filename of the currently opened data file. The range and range delay indicator, the resolution mode, and the active color scale are also displayed in the information window. In this example image: the filename is *CRABPOTS.MST*, the cursor is currently on a 20-meter sonar data line with both channels and no range delay and the data is in *Full* resolution mode.

5.2.4 Sea Scan Tool Bar

The Sea Scan tool bar located on the left side of the screen. The Sea Scan tool bar consists of a set of controls that allow you to instantly and easily change any of the display settings. The controls in the Sea Scan tool bar also provide a visual cue of the current settings. The controls may be divided into functional groups: Display Parameters; Modules; Annotations; and Preview.

5.2.4.1 Display Parameters

This group of controls allows you to change the display parameters of the sonar image data in the data window, such as color scale and data scroll direction. These display parameters are described in detail **Display Parameters** 29. The look up table parameters are described in **Color Look Up Table** 106.



5.2.4.2 Modules

This group of controls provides access to the modules. The display of the Sea Scan plotter is toggled with the *Plotter* check box. The zoom, filter, length, area, and object height measurement processes are initiated by the *Zoom*, *Filter*, *Length*, *Area* and *Height* buttons respectively. Each of the modules is described in detail in the following chapters.

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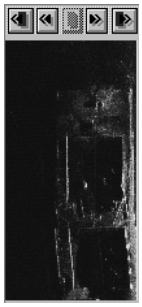
5.2.4.3 Annotations

These controls allow you to quickly change the annotations in the sonar image. You can toggle the display of the annotation symbols, place and edit annotations and monitor the number of annotations present in the current sonar image. Each of these controls is duplicated in the Options menu. The annotation options are described in detail in **Annotations** 82.

5.2.4.4 Preview



This set of controls allows you to quickly preview sonar data files. The *Preview* buttons allow you to quickly cycle through the sonar data files. The preview image of each sonar data file is displayed. The actual sonar data file may be subsequently loaded.

5.2.5 Data Window

The data window takes up most of the screen to the right of the Sea Scan tool bar and below the information window. The data window displays the sonar image data for the currently opened data file.

The window is always 512 pixels horizontally, however, depending on the screen resolution, the number of vertical pixels may vary. You may view all of the lines in the data window by scrolling up or down the screen with the vertical scroll bar.

5.3 User Parameters

5.3.1 Overview

There are a number of parameters you can set to modify the user interface according to both your level of expertise and your operational requirements.

5.3.2 Setting User Settings

Select the Settings | User… menu item in the Options menu to set the user settings. The *User Options* dialog is displayed. The dialog consists of three sections: the Shutdown Options section; the Runtime Options section; Data Modification Alert section; and the Special Features section. To enable an option, place the cursor on the corresponding check box, then press and release the left mouse button. A check mark will appear in the check box when the option is enabled.

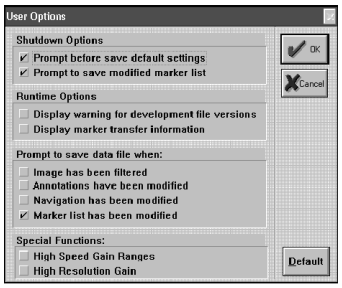


Figure 5-4 User Settings Dialog

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5.3.2.1 Shutdown Options

Prompt before save default settings

This option enables the *Sea Scan PC Review - Save Settings* dialog when you shutdown the *Sea Scan PC Review* application. Disable this option if you want to have the current settings saved automatically. However, when enabled, if any of the settings have changed, you are asked if you would like to save the new settings in the initialization file when you exit the application. A dialog is displayed that lists both the original and new settings. Any settings that have been changed are highlighted in red. You have the options of: saving the current settings in the default initialization file, *ssreview.ini*; saving the current settings in a new initialization file; exiting the application without saving the settings and leaving the settings in *ssreview.ini* unchanged; or canceling the command to exit and return to the application. Selecting the Save option is the only option that will recall the current settings automatically the next time you start the *Sea Scan PC Review* application.

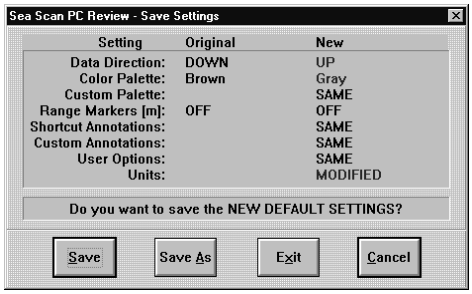

Figure 5-5 Save Settings Dialog

Prompt to save modified marker list

The *Sea Scan PC Review* application maintains a global marker list. The markers from each data file that has been loaded are inserted in the global marker list. See **5.6.7 Marker Lists** (p. 5-18) for more information about the global marker list. If this user option is enabled and the global marker list has been modified you will be prompted to save the list when you shutdown the *Sea Scan PC Review* application. Disable this option if you are not concerned about the global marker list. However, when enabled and the global marker list has been modified, you are asked if you would like to save the modified list as a *.mkr* file when you exit the application. A dialog is displayed that lists the number of markers that have been added and the number of marker Ids that have been changed. You are asked *Do you want to save the global marker list before you exit?* Select the *Yes* button to save the list. A standard *File Save* dialog will appear prompting you for a filename and path. Select the *No* button to exit the application without saving the list. Alternatively, select the *Cancel* button to return to the application.

Global Marker List Alert
The global marker list has been modified since it was last saved:
8 markers have been added
17 marker IDs have been changed
Do you want to save the global marker list before you exit?
Yes
No
Cancel
Figure 5-6 Global Marker List Alert Warning

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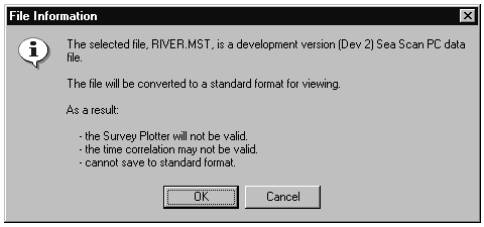
5.3.2.2 Runtime Options

Display warning for development file versions

If this option is enabled you will be warned when you attempt to read in data files that were created using development versions of the *Sea Scan PC*. Although the old data files can be read by the *Sea Scan PC Review* application, they are incompatible with the current MSTIFF data format. As a result, certain features in the *Sea Scan PC Review* application that rely on information recorded in the sonar data files are not available. A dialog will appear that lists data file version and its incompatibility with the *Sea Scan PC Review* application.


File Information
The selected file, RIVER.MST, is a development version (Dev 2) Sea Scan PC data file.
The file will be converted to a standard format for viewing.
As a result:
- the Survey Plotter will not be valid.
- the time correlation may not be valid.
- cannot save to standard format.
OK
Cancel
Figure 5-7 Development File Version Warning

Display marker transfer information

If this option is enabled, the *Marker Transfer Information* dialog is displayed when markers are transferred to the global marker list. This occurs when a new data file that contains markers is loaded. The *Marker Transfer Information* dialog displays the number of markers that are transferred from the file marker list to the global marker list. Furthermore, the number of marker identifiers that were changed is listed. Disable this option if you are not concerned about the global marker list. See **Marker Lists** 115 for more information about the file and global marker lists.

MSTIFF File
Transferring markers into GLOBAL marker list.
17 markers in the FILE marker list:
14 marker IDs were changed.
OK
Figure 5-8 Marker Transfer Information Dialog

5.3.2.3 Data Modification Alerts

If any of these options are enabled and the corresponding item in the current data file has been modified, you will be prompted to save the current data file when you exit the *Sea Scan PC Review* application or attempt to open a new data file. If you do not save the current data file, any changes you have made to the file will be lost.

5.3.2.4 Special Features

The *Special Features* section works in conjunction with the type of sonar system card that was used to collect the data being opened. For files that were created with Sea Scan PC version 1.7.0 and above, you can safely ignore this section and should make sure that none of the options are checked. If you have data files that were created with Sea Scan PC version 1.6.14 and below then you will also be able to ignore this section. Please make sure that none of the options are checked. If you have data that was collected with Sea Scan PC High Speed version 1.0.4 and below please make sure that the *High Speed Gain Ranges* option is checked. If you have data that was collected with Sea Scan PC Extended Gain (any version) please make sure that the *High Resolution Gain* option is checked. Finally, if you have data that was recorded with Sea Scan PC High Speed version 1.0.5 please make sure both options are checked.

Please note that this does not compromise Sea Scan PC Review's ability to view image data, mark targets, and view navigational data. This does however affect the program's ability to display the gain curve correctly in the Line Information 101 window.

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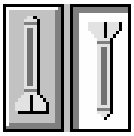
5.4 Display Parameters

5.4.1 Data Direction



The data direction may be set to scroll up or down the screen. To set the data direction, select the corresponding button in the Sea Scan tool bar. The *Towfish Up - Scroll Data Down* button will cause the data to cascade down from the top. The most recently collected data line is at the top of the image on the screen. The left channel will appear on the left of the screen. Alternatively, the *Towfish Down - Scroll Data Up* button will cause the data to scroll up from the bottom. The most recently collected data line is at the bottom of the image on the screen. The left channel will appear on the right of the screen.

The buttons for the data direction show the visual orientation of the towfish with respect to the data window. When the data direction is set to scroll down, the towfish will be “visually” pointed up. Similarly, when the data direction is set to scroll up, the towfish will be “visually” pointed down. The towfish direction is a quick visual cue to determine the orientation of the left and right channels on the screen.

Once the new data direction is selected, the *Sea Scan PC Review* will regenerate the existing sonar image data for the new perspective in the data window. If the image has been scrolled, the scroll position will be maintained after the sonar image data has been regenerated. The button for the selected data direction will appear pressed and the other data direction button will appear raised. Only one data direction button may be pressed at any given time.

5.4.2 Color Look Up Table

The color look up table indicates the mapping transformation from the 8-bit (0-255) sonar data to the 6-bit (0-63) display data. The default color look up table is a straight ramp that maps the 8-bit intensity data to the 6-bit display data as a linear function. Similar to the filter operations, the color look up table operations will only apply to the active sonar image. The look up table parameters are reset whenever a new data file is opened.

5.4.2.1 Show Color Look Up Table Window

The color look up table window allows you to set the color look up table for the entire image. Select the *LUT* button in the Sea Scan tool bar to show the color look up table window. The check box will appear pressed down and backlight with the color white.

5.4.2.2 Color Look Up Table Window

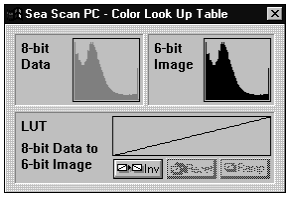


Figure 5-9 Color Look Up Table Window

The color look up table window displays two histograms, the look up table and the look up table action buttons.

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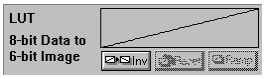
8-bit Sonar Data Histogram

The 8-bit data histogram displays the intensities of the 8-bit sonar data. The relative height of each histogram bar represents the number of data bins in the sonar image with the intensity related to the histogram bar position. The left most histogram bar represents the number of data bins with an intensity of 0 (no acoustic return). The right most histogram bar represents the number of data bins with an intensity of 255 (maximum acoustic return). This histogram will always reflect the status of the raw sonar data. You cannot apply a selective thresholding with this histogram. The histogram bars are scaled relative to the largest histogram bar. However, if one histogram bar dominates the plot, the bar for this data bin intensity is clipped and the remaining histogram bars are scaled with a more appropriate scaling factor.

6-bit Image Histogram

The 6-bit image histogram displays the intensities of the 6-bit image data after the look up table transformation from the 8-bit sonar data. The relative height of each histogram bar represents the number of pixels in the sonar image with the intensity related to the histogram bar position. The left most histogram bar represents the number of pixels with an intensity of 0 (no acoustic return). The right most histogram bar represents the number of pixels with an intensity of 63 (maximum acoustic return). This histogram will always reflect the status of the sonar image after the 8-bit raw sonar data has been transformed in to 6-bit image data by the color look up table transformation. The histogram bars are scaled relative to the largest histogram bar. However, if one histogram bar dominates the histogram plot, the bar for this pixel intensity is clipped and the remaining histogram bars are scaled with a more appropriate scaling factor.

Look Up Table



The color look up table indicates the mapping transformation from the 8-bit (0-255) sonar data to the 6-bit (0-63) image data. The default color look up table is a straight ramp that maps the 8-bit intensity data to the 6-bit display data as a linear function. The 6-bit display data is plotted as a function of the 8-bit sonar data. Thus, each value of the sonar data from 0-255 along the x-axis has a

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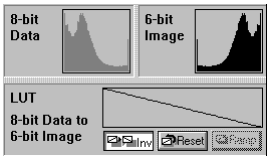
Look Up Table Buttons

Select the *Invert* button to invert the color look up table. The color look up table will be redrawn and the sonar image data and 6-bit image histogram will be regenerated and displayed using the new transformation.

The *Invert* button will appear pressed down and backlight with the color white. Select the *Invert* button again to return the color look up table to the normal mode.



Select the *Ramp* button to reset the transformation to a straight ramp. If the color look up table is currently inverted, the transformation will be an inverted ramp. Likewise, if the color look up table is not inverted, the transformation will be a non-inverted straight ramp.

Select the *Ramp* button to reset the transformation to a straight ramp. If the color look up table is currently inverted, the transformation will be an inverted ramp. Likewise, if the color look up table is not inverted, the transformation will be a non-inverted straight ramp.

Contrast Stretching

In addition to displaying the intensity distribution of the image, the 6-bit image histogram can be used to apply a selective thresholding on the image. This is also known as contrast stretching. The contrast stretching operation remaps the color look up table based on the lower and upper thresholding limits selected by you from the histogram. The purpose of this operation is to make better use of the full range of intensity values to display the image. Low contrast images, where most of the image is dark, can be expanded into the full range of intensities. Likewise, with images that appear too bright, the distribution of pixel intensities can be stretched to use the entire range of pixel intensities. This operation will result in a more balanced image.

To select the thresholding limits:

1. Move the cursor to the lower thresholding limit in the 6-bit image histogram.

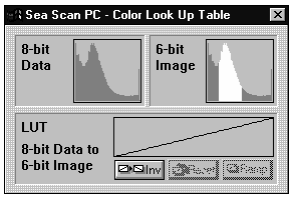


Figure 5-10 Color Look Up Table Threshold Selection

2. Press the left mouse button down. The cursor will automatically move 16 pixel intensities to the right. This is the minimum intensity value for the upper thresholding limit for the selected lower thresholding limit. The histogram bars will be redrawn such that the intensity values in the selected thresholding limits are drawn in white on a dark gray background.

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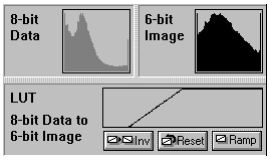
3. Keeping the left mouse button pressed down, move the cursor to the upper thresholding limit. The histogram bars are continuously updated, such that the intensity values in the selected thresholding limits are drawn in white on a dark gray background.

4. Release the left mouse button to select the upper thresholding limit.



Once a set of thresholding limits have been selected, the color look up table is remapped. The color look up table is modified to indicate the current thresholding limits. The 6-bit image display data is then remapped using the new color look up table and redisplayed. All pixels with an intensity value less than the lower thresholding limit are remapped to an intensity of 0 (minimum pixel intensity). All pixels with an intensity value greater than the upper thresholding limit are remapped to an intensity of 63 (maximum pixel intensity). All pixels with an intensity value within the thresholding limits are remapped such that the range of intensities within the thresholding limits are stretched to fill the entire range of possible intensity values. The 6-bit Image Histogram is recalculated to indicate the proper distribution for the new display image that has undergone the new color look up table transformation.

5.5 Opening a Data File

5.5.1 Overview

Sea Scan PC Review allows you to view one data file at a time. Whenever a new data file is opened, the preview, plotter and data windows are updated with contents from the new data file. There are three methods for opening a data file. You can preview the data file using either the *Sea Scan PC – Data File Preview* dialog or the Tool bar preview. In either case you have the option of opening the file after having previewed the contents of the file. Alternatively, you may open a data file directly without previewing the contents.

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5.5.2 Preview Data File

5.5.2.1 Data File Preview Dialog

Select the Preview Data File... menu item in the File menu to preview the contents of a data file. This is a quick method to view the contents of a data file without having to actually load the data file into the *Sea Scan PC Review* program. You will be prompted by the *Select SSPC Data File for PREVIEW* dialog to select a Sea Scan PC data file for preview.

Upon selection of a valid Sea Scan PC data file, the *Sea Scan PC - Data File Preview* dialog is displayed. The dialog displays a summary of the file information. The filename, the directory the data file is located, the original date and time the data file was stored, the data file version, and the resolution and compression modes are all displayed. The beginning text of any annotations present in the sonar image, condensed images of the image buffer, and the survey plotter are also displayed. The condensed image of the image buffer is displayed using the current display parameters. This preview allows you to visually confirm the contents of the data file quickly. At this point you may either: cancel the operation; open the current data file; or preview another data file.

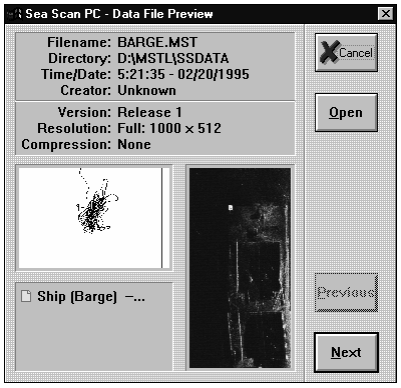

Figure 5-11 Data File Preview Dialog

The selected data file is located in a directory in the computer file system. All the *Sea Scan PC* data files in the directory are considered to be a data set. The data files in the data set are organized in ascending alphabetical order. You can preview any of the data files in the data set by cycling through the list using the *Previous* and *Next* buttons. Click the *Previous* button to preview the previous data file in the data set. Similarly, click the *Next* button to preview the next data file in the data set. The contents of the *Data File Preview* dialog are updated with the new data file's information.

Click the *Open* button to open the data file that is currently being previewed. The *Sea Scan PC - Data File Preview* dialog is removed, and the data file is read into the *Sea Scan PC Review* program. Click the *Cancel* button to simply return to the *Sea Scan PC Review* program.

5.5.2.2 Toolbar Preview

The Tool bar preview is essentially the same as the *Sea Scan PC - Data File Preview* dialog. Once a data file has been opened and displayed in the data window, the preview image is displayed in the preview section of the tool bar. You may now make use of the tool bar preview controls.

The current data file is located in a directory in the computer file system. All the *Sea Scan PC* data files in the directory are considered to be a data set. The data files in the data set are organized in ascending alphabetical order.

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You can preview any of the data files in the data set by cycling through the list using the *Preview Previous* and *Preview Next* buttons. Click the *Preview Previous* button to preview the previous data file in the data set. Similarly, click the *Preview Next* button to preview the next data file in the data set. The image in the preview section of the tool bar is updated with the new preview image. At the beginning of the list the *Preview Previous* button is disabled. Similarly, at the end of the list the *Preview Next* button is disabled.

If the current preview image does not correspond with the currently loaded data file, the *Load Current Selection* button is enabled. Click the *Load Current Selection* button to load the corresponding data file of the current preview image. The data file corresponding to the current preview image is read into the *Sea Scan PC Review* program.

If the current preview image corresponds with the currently loaded data file, the *Load Previous* and *Load Next* buttons are enabled. Click the *Load Previous* button to load the previous data file in the data set. Similarly, click the *Load Next* button to load the next data file in the data set. The new data file is automatically read into the *Sea Scan PC Review* program.

5.5.3 Opening a Data File

Select the Open Data File... menu item in the File menu to open a *Sea Scan PC* data file. You will be prompted by the *Open SSPC Data File* dialog to select a valid *Sea Scan PC* data file. Upon selection of a valid data file, the file is read into the *Sea Scan PC Review* program.

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5.5.4 Reading a Data File

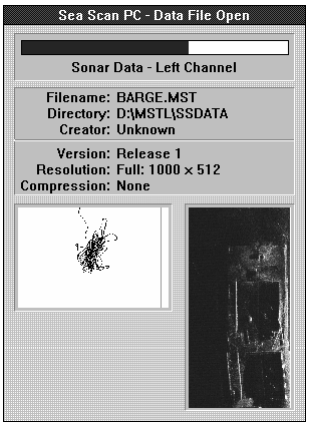

Figure 5-12 Data File Open Dialog

Recall that the *Sea Scan PC Review* can only view one data file at a time. Any information about the current data file is lost when a new data file is read into the *Sea Scan PC Review* program. If the current data file has been modified, you will be alerted. A dialog will be displayed with a list of modifications. You are prompted to either save the current data file with the new changes and then read the newly selected data file or to ignore the modifications and read the newly selected data file directly.

Once a valid *Sea Scan PC* data file has been selected using either method described above, a *Sea Scan PC – Data File Open* dialog is displayed informing you that a file is now being read. The dialog displays the name and directory, the file version, and the resolution and compression modes of the new data file. It also contains a thermometer that allows you to monitor the progress of the data reading process. Condensed images of the image buffer, and the survey plotter are displayed for your reference in the dialog. Once the entire contents of the data file have been read, the filename, the flag indicating the presence of range delay in the sonar record, and the resolution mode are written in the information window. Then, the sonar image is generated from the raw sonar record lines. A dialog, with a thermometer, is displayed allowing you to monitor the progress of the procedure. Once the sonar image has been generated, the sonar image is displayed in the data window. A preview image is displayed in the preview section of the tool bar. The visible section of the data window is set to display the latest lines of the image buffer. You must either scroll up, or down depending on the data scroll direction setting, to view the rest of the sonar image. The navigational information is then processed. The current plotter is automatically configured with the position information. Thus, the ship's track is centered on the current plotter when it is displayed. The image of the survey plotter from the data file is displayed when the survey plotter is made active.

5.6 Plotter

5.6.1 Overview

The features of the integrated Sea Scan plotter in the *Sea Scan PC Review* are identical to their counterparts in the *Sea Scan PC* program, except for a few minor exceptions. Only these minor exceptions will be discussed in detail in this chapter. For all other feature descriptions, please refer to the corresponding feature descriptions for the *Sea Scan PC* plotter in **Plotter** 38.

The major difference between the *Sea Scan PC Review* plotter and the *Sea Scan PC* plotter is the aspect of real-time navigational input display. For obvious reasons, the *Sea Scan PC Review* plotter does not display real-time navigational information. It displays the navigational information that was stored with the image buffer in the data file.

In the *Sea Scan PC* plotter, the information window is used to display the real-time navigational information. The range/bearing and track survey features are used to display the range and bearing to and from selected markers based on the real-time navigational information. Since the *Sea Scan PC Review* plotter does not have any need for real-time navigational information the information window and the range/bearing and track survey features are not present.

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The marker rename feature, more appropriately named the target identification edit feature, has been significantly enhanced to allow you to edit the complete marker information for estimated and nadir markers. In the *Sea Scan PC* plotter you can only edit the name of the marker. From the *Sea Scan PC Review* plotter you can edit every aspect of the information related to the marker, such as the slider positions that determine the target height and position along the sonar swath line.

The clear track feature has been enhanced to allow you to erase any bad position fixes that have been mistakenly included in the stored navigational information.

The *Sea Scan PC Review* plotter tool bar contains three new buttons, the *Print* and *Read/Save Settings* buttons.

A global marker list has been introduced that compiles a comprehensive list of all the markers from each data file that was loaded. The markers from any data file that is read by the *Sea Scan PC Review* application are automatically transferred to the global marker list. The global marker list is a simple way to compile a complete marker list for a specific set of data files.

5.6.2 Plotter Display

When the *Sea Scan PC Review* application opens a new data file the navigational information that was stored in the data file is processed and displayed by the plotter. The current plotter is automatically configured with the position information. Thus, the survey vessel's track is centered on the current plotter when it is displayed. Although the navigational information provides a continuous recording of position information, there are two separate distinct sections based on time. The first section contains the navigational information that was collected during the same time period as the sonar record lines that were saved in the data file. The other section contains the navigational information that was collected before the time period the sonar record lines in the data file were recorded. The former sector may be thought of as the "imaged" section of the navigational information since the sonar imagery for that position information is available in the data file. When displayed in the current plotter, the estimated swath coverage for this "imaged" section of the navigational information is drawn in burgundy red. The estimated swath coverage for the later section, the "pre-imaged" section, is drawn in the dark gray.

The survey plotter displays the image of the survey plotter that was stored in the data file. Unlike the *Sea Scan PC* plotter, you cannot manipulate the boundary coordinates or the presentation of the fixed image in the survey plotter. However, you can still add and erase markers and waypoints from the fixed image in the survey plotter.

5.6.3 Edit Target Identification Window

The target identification edit feature allows you to edit the complete target identification information for estimated and nadir markers. In the *Sea Scan PC* plotter you can only edit the descriptor name of the marker using the marker rename feature. However, from the *Sea Scan PC Review* plotter you can select a marker using the marker rename feature and edit every aspect of the target identification information, such as the slider positions that determine the target height and position along the sonar swath line.

You can only edit markers in this manner that correspond directly to the current data file. In other words, only markers that were previously created by selecting a feature in the current sonar image can be edited in this manner. These markers are considered *active* markers. Active markers that correspond directly to the current sonar image are displayed in the plotter with an enhanced marker icon, a bright pink square with a black box around the outer edge. Alternatively, *inactive* markers that do not correspond directly to the current sonar image are displayed using the standard marker icon, a dark pink square. You can only edit the descriptor name of inactive markers that are displayed in the plotter with the standard marker icon.

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1. Select the *Target Edit* button in the plotter tool bar. The cursor will change to the "target edit" cursor.
2. As the cursor is moved in the plotter, the attributes of the closest marker are displayed in the marker information window of the plotter. The descriptor name and the marker/waypoint attribute status are displayed. If the closest marker is a waypoint, then the description *Waypoint* is displayed. Otherwise, the active/inactive status of the marker, as described above, is displayed as *ACTIVE* and *INACTIVE* respectively. If the marker attributes, such as target height, have previously been set the active/inactive status is followed by – *SET*. Alternatively, if the marker attributes have not yet been set, the status is followed by – *CLR*.
3. Press and release the left mouse button to select the current marker.

When you select a marker in the plotter with the target edit feature, the *Sea Scan PC - Target Identification* dialog will appear. The dialog is essentially identical to its counterpart in the *Sea Scan PC* application. Please refer to **Plotter-Sonar Image Interaction - Marking a Feature – Standard Method** 55 for more detailed information. However, you can print the target identification information directly from the dialog in the *Sea Scan PC Review* application. Select the *Print* button to print the target, transducer and external information. The A-Mode and B-Mode views of the selected sonar data line are printed. The orientation view and the surrounding water depth and magnetic field readings, if they are available, are also printed.

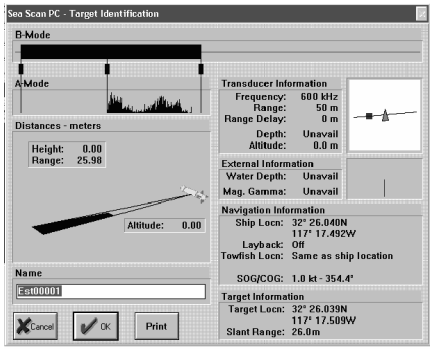

Figure 5-13 Target Identification Dialog

5.6.4 Clear Track

The clear track feature operates a little differently in the *Sea Scan PC Review* Plotter. To clear the navigational position information, you can either delete a single navigation point, or a selected group of navigation points.

1. Select the *Clear Track* button in the plotter tool bar to delete navigation points. The cursor will change to the "clear track" cursor and the message *Delete nav. pts* will appear in the status window.

2. To delete a single navigation point, move the cursor close to the navigation point you want to erase. Then, press and release the left mouse button. The navigation point closest to the cursor is erased. This action may not be undone. If there are many navigation points close together, you may want to zoom in on the group in order to select the correct navigation point without any problems.

   To delete a selected group of navigation points, move the cursor to one corner of the group. Press the left mouse button and, keeping the left mouse button pressed down, move the mouse to the opposite corner of the group. A black box will be drawn, indicating the selected group, as you move the mouse. Upon releasing the left mouse button, all navigation points within the black selection box will be erased.

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3. The *Delete nav. pts* message is cleared from the status window and you are returned to the Sea Scan plotter.

Markers and waypoints are not cleared. To erase markers and waypoints, please refer to **Marker and Waypoint Delete** 51.

5.6.5 Print

Select the *Print* button in the Sea Scan plotter tool bar to print the plotter information to the default printer.

You will be prompted by the *Sea Scan PC - Print Plotter* dialog to select the print options. You can chose to print any combination of the following items: the file information at the top of each printed page; the image of the current plotter; the image of the survey plotter; a list of the current markers and waypoints. To select an item, place the cursor in the corresponding check box, then press and release the left mouse button. A check mark will appear in the check box to indicate the item has been selected to be printed. Likewise, to unselect an item, place the cursor in the corresponding check box, then press and release the left mouse button again. The check mark will now be removed from the check box to indicate that the item will not be printed. Select the *OK* button or hit Return to print the selected items. The selected items will be printed to the default printer. Select the *Cancel* button to cancel the print process.

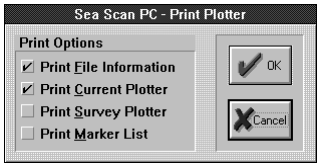

Figure 5-14 Print Plotter Dialog

5.6.6 Read/Save Settings

The plotter maintains a private section in the initialization file for the plotter display parameters. However, you may maintain multiple initialization files for the *Sea Scan PC Review* plotter. The display parameters may be saved in an *.ini* file and read from a valid *.ini* file at any time. This feature is useful to maintain a consistent and independent set of plotter display settings for multiple data files.

Select the *Read Settings* button in the plotter tool bar to read in a set of predetermined display settings from an initialization file. You will be prompted by a dialog to select a valid initialization file for the plotter. Upon selection of a valid initialization file, the plotter display parameters will be reset to the selected parameters. The new settings are effective immediately and the application does not have to stopped and restarted.

Select the *Save Settings* button in the plotter tool bar to save the current Plotter display settings to a *.ini* file. You will be prompted by a dialog to set a filename and a destination directory. Upon selection of a valid filename and location, the plotter display parameters will be written to the *.ini* file. This action does not change any of the existing parameters.

5.6.7 Marker Lists

The *Sea Scan PC Review* application maintains two marker lists: the file marker list and the global marker list. The file marker list is a temporary list that maintains the markers attached to each data

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file. The global marker list is a comprehensive list of all the markers that have been read each time the *Sea Scan PC Review* application is run. The markers from *.mst* data files and *.mkr* marker files are automatically transferred to the global marker list. The global marker list is a simple way to compile a complete marker list for a specific set of data files.

5.6.7.1 Monitoring Marker Lists

You may monitor the marker lists by selecting the Markers|Status menu item from the Options menu. This menu command toggles the display of the *Marker Information* dialog. A check mark will appear next to the Markers|Status menu item when the dialog is visible. The dialog may be moved anywhere on the screen. When the dialog is removed, its position is remembered for the next time it is displayed. The *Marker Information* dialog consists of three distinct sections: the Current Action section; the Global Marker List section; and the Current File Marker List section.

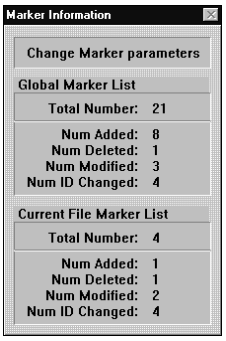

Figure 5-15 Marker Information Status box

Current Action

The Current Action section displays the most current marker list action. When markers are read from a new Sea Scan data file (MSTIFF format) the message *Read Markers from MSTIFF* will be displayed. As another example, when a marker is added from the sonar image the message *Add marker from image* is displayed. This section displays the most current action affecting the marker lists. The message will remain in this section until another action updates the message.

Global Marker List

This section displays information about the contents of the global marker list. The total number of markers in the list is displayed. Furthermore, the number of markers added, deleted and modified are also listed. Finally, the number of markers whose internal identification number has been changed are also listed. A unique internal identification number is assigned to each marker automatically when it is created. These numbers are assigned sequentially by the *Sea Scan PC* application. Thus any number of markers, from different *Sea Scan PC* sessions, may have the same internal identification number. In this situation, it is necessary to change any duplicate internal identification numbers so that each marker in the global marker list still has a unique internal identification number. This modification does not affect the integrity of the marker information.

Current File Marker List

This section displays information about the contents of the current file marker list. The same information as shown for the global marker list is displayed. However, the current file marker list only applies to the temporary list attached to the current data file. It is possible that the unique internal identification number for a marker will need to be changed if a marker already exists in the global marker list with this same number. The number of markers that have modified in this manner is listed as *Num ID Changed*.

5.6.7.2 Monitoring Marker Transfer Information

The *Marker Transfer Information* dialog is displayed when markers are transferred to the global marker list. This occurs when a new data file that contains markers is opened. The *Marker Transfer Information* dialog displays the number of markers that are transferred from the file marker list to the global marker list. Furthermore, the number of internal identification numbers that were changed is listed. See **Global Marker List** above for more information about the internal identification number.

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The option to display the *Marker Transfer Information* dialog can be disabled in the user options. See **Setting User Settings** 103 for more information about the user options.

5.6.7.3 Save Global Marker List

The global marker list may be saved to disk. Even markers and waypoints that are not visible within the plotter boundary coordinates are stored.

Save Global Marker List - Standard

Select the Markers|Save As… menu item from the Options menu to save the global marker list in a *.mkr* marker file. A *Save Waypoint File As* dialog will appear prompting you for a filename and path. Upon selection of a valid filename and path the marker and waypoint data will be saved. Please refer to **Marker/Waypoint Data File** 168 for more information about the waypoint data file format.

Save Global Marker List - On Exit

If the global marker list has been modified you will be prompted to save the list as a *.mkr* file when you shutdown the *Sea Scan PC Review* application. A dialog is displayed that lists the number of markers that have been added and the number of marker Ids that have been changed. You are asked *Do you want to save the global marker list before you exit?* Select the *Yes* button to save the list. A *Save Waypoint File As* dialog will appear prompting you for a filename and path for a new *.mkr* marker file. Alternatively, select the *No* button to exit the application without saving the list. Finally, select the *Cancel* button to return to the application. The option to save the global marker list on exit can be disabled in the user options. See **Setting User Settings** 103 for more information about the user options.

5.6.7.4 Read Marker File

Markers and waypoints may be read from disk. This feature allows you to display a set of waypoints that have been previously stored or typed into a properly formatted *.mkr* marker file with a simple text editor. Please refer to **Marker/Waypoint Data File** 168 for more information about the waypoint data file format.

Select the Markers | Open… menu item from the Options menu to read markers from a *.mkr* marker file. An *Open Marker File* dialog will appear prompting you for the filename and path of a valid waypoint file. Upon selection of a valid waypoint data file, the plotter will attempt to read all of the markers and waypoints. If for any reason, the Sea Scan plotter cannot read all of the markers and waypoints you will be informed of the number of successful reads. The new number of markers and waypoints is displayed in the status window. The new markers and waypoints from the waypoint data file are displayed immediately although some may not be visible in the current plotter boundary coordinates. To ensure that you can see all of the markers and waypoints, select the *Automatic Configuration* button while holding down the **Control** key. This will automatically center the track points as well as all the markers. Furthermore, all markers and waypoints are automatically transferred to both the global marker list and the file marker list.

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5.7 Zoom

Sea Scan PC Review allows you to zoom in on any section of the sonar image. The selected section is displayed in a separate window that floats on top of the data window containing the raw sonar data. You may perform multiple zooms on the selected section and also measure features contained in the zoom window. This allows for a more accurate measurement of smaller features, since you can place the cursor more precisely at the beginning and end of the feature. The zoom feature is essentially identical to its counterpart in the Sea Scan PC application. Please refer to **Zoom** 58 for more detailed information. However, there have been a few additions to the zoom window in the *Sea Scan PC Review* application.

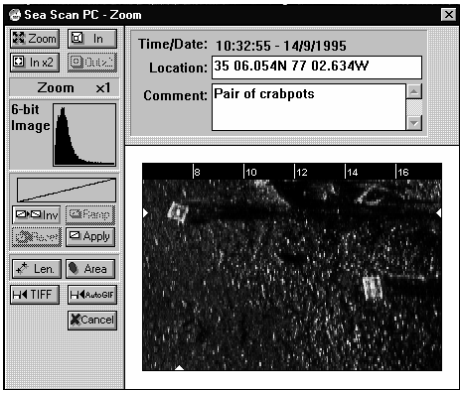

Figure 5-16 Zoom Window

5.7.1 Quick Zoom Selection Operation

A quick zoom selection operation has been added to the *Sea Scan PC Review*. To quick zoom on a section of the sonar image center the cursor over the section of the sonar image you would like to view in the zoom window. Then double click the right mouse button without moving the cursor. The selected section with the default dimension, as set by the zoom settings, will appear centered in the zoom window. The selected section may not extend past the physical edges of the sonar record. In this case, when selecting an object at the edge of the sonar image, the zoomed edge is set to the physical edge and the selected image is off-center in the zoom window.

5.7.2 Zoom Settings

Select the Settings|Zoom… menu item in the Options menu to set the zoom settings. The *Zoom Options* dialog is displayed. The dialog consists of two sections: the Window Dimension section; and the AutoGIF Storage Directory section.

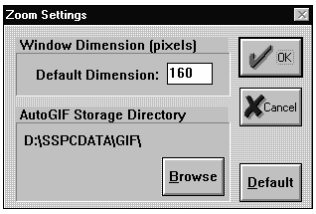

Figure 5-17 Zoom Settings Dialog

Window Dimension

Enter the dimension in pixels of the default selection when the operator uses the quick zoom operation to make the selection for the zoom window. The default dimension may be up to 160 pixels.

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AutoGIF Storage Directory

Select the *Browse* button to browse the computer's file system for a new default directory. The *AutoGIF – Destination* dialog will appear. Navigate through the computer's file system to select a default directory. Select the new default directory by clicking the *OK* button or hitting Return. You will be returned to the *Zoom Settings* dialog and the new default directory is displayed.

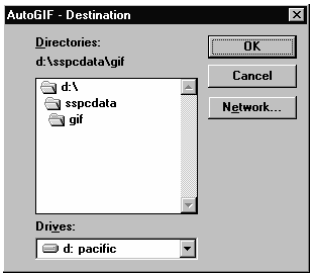

Figure 5-18 AutoGIF – Destination Dialog

5.7.3 Auto GIF Operation

The AutoGIF operation is a significant enhancement to the zoom window. The AutoGIF operation includes a number of time-saving operations that allow the operator to quickly generate a GIF file of the image in the zoom window.

A horizontal scale has been added along the top of the zoom image. The scale indicates the absolute range from the transducers in meters and provides a scale reference when the image data is stored as a GIF.

Select the *Save As AutoGIF* button to save the current zoom image as a GIF in the AutoGIF storage directory. Furthermore, an entry is generated in the log file, *gifinfo.txt*, which contains reference information for all of the generated GIF images.

A comments section has been added to the zoom window. The time/date, location and comment fields are added to the log file entry for the automatically generated GIF file. See refer to **AutoGIF Information Log File** 176 for more information on the AutoGIF information file. The white arrows along the left, right and bottom edges of the zoom image indicate the location that is listed in the *Location* edit box. To change the indicated location, move the cursor to the desired location and press the left mouse button. The time/date and location information will be updated accordingly.

5.7.4 Cancel

Select the *Cancel* button to remove the zoom window quickly. The *Cancel* button has been added so the operator can quickly close the zoom window during the AutoGIF operation without having to toggle the *Zoom* button in the Sea Scan tool bar.

5.7.4.1 Area

You can measure the area of a feature in the zoom window. Please refer to **5.10 Area Measurement** (p. 5-30) for more information about the area measurement process.

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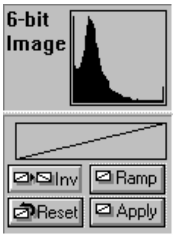
5.7.5 Color Look Up Table



You can manipulate the color look up table for the zoom image. The look up table threshold selection process and action buttons are similar in operation to the look up table action buttons outlined in **Color Look Up Table Window - Look Up Table Buttons** 108 for the entire sonar image. These buttons only operate on the zoom image. However, in addition, select the *Apply LUT* button to apply the zoom image color look up table to the entire image.

5.7.6 Save As Tiff...

Select the *Save As TIFF…* button to save the current zoom image as a TIFF. TIFF is a standard file format for images, thus allowing the zoom image to be imported by most third-party image processing applications and word processors. You will be prompted to name the file and location. A default file name with a unique sequential numbering scheme is preset for automatic data storage. The image is recorded in the current color scale using the current color look up table transformation.

5.8 Filter

5.8.1 Overview

This chapter describes the features of the Sea Scan filter. The filter operation allows you to process the raw sonar image data with a variety of filters to accentuate different aspects of the image.

Although each of the filters is described, it is recommended to try the various filters to see the resulting effects. After you have taken into account image resolution and system capabilities, it is understood that there is no absolute definition of a “good” side scan sonar image. However, in general terms, a “good” image simply enables you to see what you need to see. The Sea Scan filter allows you to “see” the raw image differently.

You may initially process a small sample section (256 x 256 pixels) of the sonar image. You can experiment with the various filters on the small sample image first. The filter sequence used on the sample image may be recorded and then applied to the entire sonar image. The complete Sea Scan filter features are detailed later in this chapter.

The sample image is displayed in the same manner in the filter window as the sonar image is displayed in the data window. Recall that there is twice as much horizontal information than can be displayed on the screen in the normal viewing mode. Thus, for every pixel on the screen, there are really two pixels in the raw sonar image and the most intense of the two pixels is drawn on the display. This preserves a proper aspect ratio of 1:1 for the sonar image while allowing twice the axial resolution. The filters in the filter window process the full resolution image and not just the display resolution image.

5.8.2 Selecting a Sample Image

You may begin the filter process on any section of the sonar image. You may be required to scroll the sonar image to make the desired section visible.

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1. Select the *Filter* check box in the Sea Scan tool bar to select a section of the sonar image to filter. The check box will appear pressed down and backlight with the color white. The cursor will change to the “filter selection” cursor.
2. To select a 256 x 256 pixel section as the sample image, center the cursor over the section you would like use. Then press and release the left mouse button without moving the cursor. The selected section of the sonar image will be displayed in the filter window.

   The selected section may not extend past the physical edges of the sonar record. In this case, when selecting an object at the edge of the sonar image, the selection edge is set to the physical edge and the selected center of the image is off-center in the Filter window.

If you have already selected a sample image and the filter window is visible, you may select a new sample image without having to explicitly close the filter window. Select the *Reselect* button to select a new sample image. The filter window is automatically removed and the cursor will change to the “filter selection” cursor. Repeat instruction 2 from above to select a new sample image.

5.8.3 Filter Window

5.8.3.1 Overview

The filter window allows you to try different filters on the sample image. The final filter sequence can be recorded and then applied generally to the entire image. The filter window consists of six sections: the Original Sample Image; the Filtered Sample Image; the Filter Selection list; the Filter Action buttons; the Filter Sequence Recorder; and finally the Color Look Up Table.

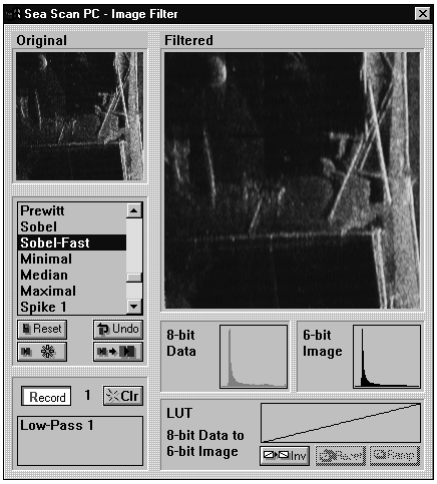

Figure 5-20 Image Filter Window

5.8.3.2 Original Sample Image

A condensed image (50%) of the original sample image is always displayed. This allows you to compare the results of a filter operation, or a sequence of filter operations, with the unfiltered original image at all times.

5.8.3.3 Filtered Sample Image

The sample image is displayed, at display resolution, in the filter window. Thus, just like in the data window, for every pixel in the image, there are really two horizontal pixels. The more intense of the two pixels is used in the sample image. This “Filtered Sample Image” display shows the results of the selected filter operations. Upon the completion of a filter operation, the “Filtered Sample Image” section is updated with the resulting image. This section always displays the current state of the filtered image, so you can see the result of successive filter operations. In other words, for sequences of filters, subsequent filter operations are always applied to the image resulting from the previous filter

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operation and not the original image.

5.8.3.4 Filter Selection

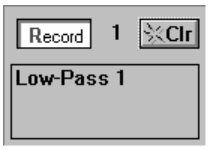
The filter selection list allows you to select a predefined filter operation. The selected filter operation is always applied to the image that is displayed in the "Filter Sample Image" section. There are many different groups of filters that, when applied to the sample image, provide very different results. Each of the filters is described in detail later in this chapter.

5.8.3.5 Filter Actions

The *Reset* and *Undo* buttons allow you to perform these often used filter actions quickly and easily. The *Reselect* button allows you to select a new sample image from the sonar image. Finally, the *Apply Filter Sequence* button allows you to apply the recorded filter sequence to the entire sonar image.

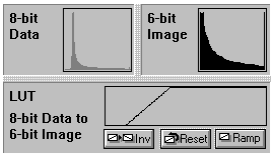
5.8.3.6 Filter Sequence Recorder

You can record a sequence of filter operations used on the sample image and then apply this sequence to the entire sonar image. This section controls the recording of the filter sequence.



5.8.3.6.1 Color Look Up Table

This section displays two histograms, the color look up table and look up table action buttons. The 8-bit data histogram indicates the intensities of the data bins in the original sample image. The 6-bit image histogram indicates the intensities of the pixels in the filtered sample image. The relative height of each histogram bar represents the number of data bins or pixels in the source images with the intensity related to the histogram bar position. In the 8-bit data histogram the left most histogram bar represents the number of data bins with an intensity of 0 (no acoustic return). The right most histogram bar represents the number of data bins with an intensity of 255 (maximum acoustic return). In the 6-bit image histogram the left most histogram bar represents the number of data bins with an intensity of 0 (no acoustic return). The right most histogram bar represents the number of pixels with an intensity of 63 (maximum acoustic return). The histogram bars are scaled relative to the largest histogram bar. However, if one bar dominates the histogram plot, the bar for this data bin intensity is clipped and the remaining histogram bars are scaled with a more appropriate scaling factor. The color look up table operations are described in detail in **Color Look Up Table** 120.



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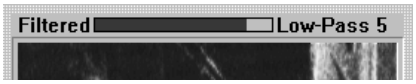
5.8.4 Filter Operations

5.8.4.1 Overview

There are a number of different types of filter operations available in the Sea Scan filter. However, each filter operation has essentially the same purpose, which is to alter the sample image. Altering the sample image may mean to either accentuate a specific characteristic, such as vertical lines, or remove noise from the image, or some other operation.

5.8.4.2 Selecting a Filter Operation

To select a specific filter operation place the cursor over the filter you would like to apply to the sample image. Then press and release the left mouse button once. You do not have to double click the mouse button to select the filter operation.



The name of the selected filter is written to the right side of the filtered image title bar. The filter is then applied to the sample image. The filter operations are always applied to the sample image. Thus, a sequence of filters is successively applied to the sample image. A thermometer is displayed to the left of the name allowing you to monitor the progress of the filter operation. Upon completion of the filter operation, the thermometer and name are removed from the filtered image title bar and the resulting filtered sample image is displayed. If the option to record the selected filter is enabled, the filter operation is added to the filter sequence.

5.8.4.3 Point Operations

The following filter operations all work on a point basis. In other words, each point in the sample image is considered independently of its neighboring points. These filters are typically quite fast since they do not need to consider the neighboring points for every point in the sample image. The *Reset* and *Undo* operations are selected by clicking the respective buttons located below the filter selection list. All other filter operations are selected by clicking on the corresponding name in the filter selection list.

The following symbols for the filtered, stored and original sample images are used to help describe the point operations:

- ***F*** ***F***iltered sample image
- ***S*** image in the ***S***torage buffer
- ***O*** ***O***riginal sample image

For example: ***O*** ® ***F*** the ***O***riginal sample image is placed in the ***F***iltered sample image.

Reset
(O ® F)
Reset the filtered sample image back to the original sample image.

Undo
Undo the previous filter operation. The undo operation only works on the latest operation. You may undo the undo operation also. Thus, you may toggle between two filtered states with the *Undo* button. If a filter operation has been recorded, it is removed from the filter sequence.

Store
(F ® S)

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Store the current filtered sample image in a storage buffer. The storage buffer is used in subsequent filter operations that combine two images, such as the Add filter operation.

Get Store
(S ® F)
Retrieves the filtered sample image from the storage buffer. This operation places the image that is stored in the storage buffer in the filtered sample image. When the Sea Scan filter is initiated, the original sample image is placed in the storage buffer.

Plus
(F+4 ® F)
Increase the intensity of each pixel in the sample image by four levels. For example, if a pixel value has a current value of 24, the pixel value is increased to 28. This has the result of shifting the pixel intensity histogram to the right, indicating the overall pixel intensity has been increased.

Minus
(F-4 ® F)
Decrease the intensity of each pixel in the sample image by four levels. For example, if a pixel value has a current value of 24, the pixel value is decreased to 20. This has the result of shifting the pixel intensity histogram to the left, indicating the overall pixel intensity has been decreased.

Expand 1.25, 1.5, 1.75, 2.0
(F x Factor ® F)
Increase the intensity of each pixel in the sample image by the indicated factor. For example, if a pixel value has a current value of 24 and the Expand 1.5 filter operation is selected, the pixel value is changed to 36 (= 24 x 1.5).

Average
((F+S)/2 ® F)
The filtered sample image and the image in the storage buffer are averaged together on a pixel-by-pixel basis. This filter operation makes use of the image in the storage buffer.

Add
(F+S ® F)
The filtered sample image and the image in the storage buffer are added together on a pixel-by-pixel basis. This filter operation makes use of the image in the storage buffer.

Subtract
(F-S ® F)
The image stored in the storage buffer is subtracted from the filtered sample image on a pixel-by-pixel basis. This filter operation makes use of the image in the storage buffer.

5.8.4.4 Area Operations

The following filter operations all work on an area, or group, basis. The group of pixels around each point in the sample image, the neighborhood, is used to derive information for that pixel in the resulting image. The pixel of interest, at the center of the neighborhood, has a new value determined by an algorithmic computation. In other words, each point in the sample image is considered in its mathematical relationship to its neighboring points. A new value is calculated for every pixel in the image, based on a computation involving the pixels itself and the neighborhood. This type of computation allows you to accentuate trends, such as lines, in the data. These filters are typically slower than the point operations since they need to consider the neighboring points for every point in the sample image.

The most typical area operation involves a convolution of the sample image with a filter kernel. For these area operations, the two-dimensional filter kernel is included in the filter operation description. Other area processes, such as the median filter operation, do not make use of a filter kernel and the convolution process. In these cases, a kernel description is obviously not included in the filter operation description.

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Low-Pass Spatial Filters
This set of filters removes the high-frequency content of the image. In other words, they tend to blur the image, since the low-frequency changes are accentuated.

High-Pass Spatial Filters
This set of filters removes the low-frequency content of the image. They tend to sharpen the image. However, the image noise, which is typically high frequency in nature, is increased also in most cases.

Edge Enhancement
These sets of filters enhance the line content, the edges, in the image. The resulting image is drastically different from the original image, since only the edges remain. The greater the change in pixel intensity at the edge, the more intense the edge will be displayed in the resulting image. This is a useful set of filters to extract features from image data.

Shift and Difference Edge Enhancement
The shift and difference edge technique is the simplest and fastest of the edge detection schemes available. Horizontal, vertical and diagonal lines are enhanced with these respective filter operations.

Matched Edge Enhancement
The matched edge technique strongly emphasizes the horizontal and vertical edges in the respective filter operations.

Gradient Directional Edge Enhancement
The gradient directional edge technique selectively emphasizes the edges in a specific direction. Using north as up, the filters enhance the edges found in the respective directions only.

Laplacian Edge Enhancement
The Laplacian edge enhancement technique is an omnidirectional edge enhancement operation. These filters will accentuate the edges in all directions and will delineate sharper edges than the other edge enhancement techniques listed above. The Laplace 1 filter operation is an approximation of the Laplacian operator used in mathematics. The other Laplacian filter operations are variations on this approximation. Although the Laplacian edge enhancement technique is omnidirectional, the filter operation selectively emphasizes lines in the horizontal, vertical and diagonal directions if so directed.

Embossing
These filters have an interesting visual effect on the image. The resulting image appears embossed, by adding lighting and shadowing to the images along the edges. The direction for the filter operation specifies the direction along which the edges are lighted and shadowed to create the embossing effect.

Statistical (Nonlinear) Edge Detection
The Prewitt and Sobel edge detection operations are highly reliable omnidirectional edge detection algorithms. Although they generate better results, these two operations are computationally complex and require a longer time than the other edge detection operations. A faster implementation of Sobel's edge detection algorithm, Sobel-Fast, is provided. Although faster, it is not as reliable an omnidirectional edge detection operation as the slower Sobel operation.

Statistical (Nonlinear) Selection
These filters sort the pixels from the surrounding neighborhood in ascending order. The pixel of interest, the pixel in the middle of the neighborhood, is replaced by a pixel selected from the sorted list of pixels. The Minimal operation replaces the pixel of interest with the minimum pixel intensity from the sorted list. The Median operation replaces the pixel of interest with the median pixel intensity from the sorted list. The Maximal operation replaces the pixel of interest with the maximum pixel intensity from the sorted list.

Statistical (Nonlinear) Noise Reduction
The Spike 1 filter operation will remove speckle from the image. Speckle noise will creep into the

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sonar image if there is an electrical noise problem. The Spike 2 filter operation will remove horizontal streak noise from the image. Horizontal streaks will appear in the sonar image in there is a source of acoustic noise, such as a depth sounder. The acoustic noise is typically limited to one horizontal line, thus appearing as a horizontal streak in the sonar image.

5.8.4.5 Color Look Up Table Operations

The Color Look Up Table operations, such as inverting and contrast stretching the look up table, are described in detail in **Color_Look_Up_Table** 120. The look up table operations are applied directly to the sample filtered image.

5.8.4.6 Recording a Filter Sequence

You can record a sequence of filter operations used on the sample image and then apply this sequence to the entire sonar image. Select the *Record* check box to begin recording the selected filter operations.

The *Record* check box will appear pressed down indicating that any filter operations applied to the sample image will be recorded. When a filter operation is selected, the filter is listed in the filter sequence list and the filter sequence counter is incremented to reflect the number of filters in the sequence. Select the *Clear Filter Sequence* button to clear the list at any time. To stop recording filter operations, select the *Record* check box again. The *Record* check box will now appear raised to indicate that any selected filter operations will not be recorded. A filter sequence can be reviewed by scrolling up and down the list using the vertical scroll bar to the right of the list. A filter sequence remains available to be applied to the entire sonar image as long as it is displayed in the list.

5.8.5 Useful Filter Sequences

The following filter sequences are useful for specific tasks. The end effect on the sample image for the listed filter sequence is described and then the filter sequence itself is listed. Each filter sequence assumes you are starting with the original sample image.

Sharpen the image

Sharpen the image, without increasing the noise. The low-pass features are subtracted from the original image. This increases the relative high frequency content of the image without having to perform a high-pass filter operation.
Low-Pass –Store – Reset - Subtract

Sharpen the edge features

Sharpen the edge features, without losing the general image. Add the resulting image from the omnidirectional Sobel edge detection operation and the original image together.
Store - Sobel - Add

Sharpen the edge features, without losing the general image. Add the resulting image from the omnidirectional Laplace 3 edge enhancement operation and the original image together.
Store - Laplace 3 - Add

Increase the contrast

Increase the contrast in images that were recorded with the gain settings too low. Expand the lower

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end of the pixel intensities throughout the entire range of intensities available.
Contrast stretch the 6-bit Image Histogram

Remove electrical noise

The speckle caused by electrical interference in the sonar image may be removed. This operation is more selective than the Median filter. The Median filter performs essentially the same operation, but it tends to blur the image more than necessary.
Spike 1

Remove acoustic noise

The horizontal streaks caused by acoustic interference in the sonar image may be removed. This operation is a more selective noise removing operation than the Spike 1 filter. This noise removal operation works exclusively for horizontal streaks.
Spike 2

5.8.6 Filtering Entire Data File

Select the *Apply Filter Sequence* button to apply the recorded filter sequence to the entire sonar image. The *Apply Filter Sequence* button will appear pressed down and backlight by the color white.

The *Entire Image Filter* dialog is displayed. This dialog lists the filter operations in the recorded sequence from the top to the bottom. There are a number of overhead operations listed also. These operations are necessary for the smooth application of the filter sequence to the entire sonar image and they require a certain amount of time to be performed also. The Sea Scan filter must allocate the necessary buffers for the filter process, transfer the raw image data from the image buffer and then initialize the buffers. After the filter sequence has been applied to the entire sonar image, the newly filtered image must be transferred back to the image buffer. There is a thermometer for each item in the list so you can monitor the progress of each operation.

The *Entire Image Filter* dialog is displayed. This dialog lists the filter operations in the recorded sequence from the top to the bottom. There are a number of overhead operations listed also. These operations are necessary for the smooth application of the filter sequence to the entire sonar image and they require a certain amount of time to be performed also. The Sea Scan filter must allocate the necessary buffers for the filter process, transfer the raw image data from the image buffer and then initialize the buffers. After the filter sequence has been applied to the entire sonar image, the newly filtered image must be transferred back to the image buffer. There is a thermometer for each item in the list so you can monitor the progress of each operation.

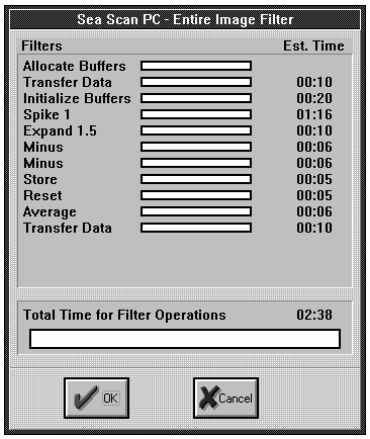

Figure 5-21 Entire Image Filter Dialog

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5.9 Length Measurement

Sea Scan PC Review allows you to measure any feature in the sonar image data with the cursor. The length is presented as a transverse (vertical, along the direction of the towfish), an axial (horizontal, along the axis of the sonar beam), and a total length. The lengths are measured in real-world units. The range and ping separation distance for each sonar record line are sufficient to accurately calculate the length of features in the sonar record. The length measurement feature is identical to its counterpart in the *Sea Scan PC* program. Please refer to **Length Measurement** 77 for more detailed information.

5.10 Area Measurement

5.10.1 Overview

Sea Scan PC Review allows you to measure the area of any feature in the sonar image with the cursor. The area measurement can be made in both the data and zoom windows. The area, measured in real-world units, is displayed in the universal units as set by the *Units* dialog. The range and ping separation distance for each sonar record line are sufficient to accurately calculate the area of features in the sonar record.

5.10.2 Factors Affecting Area Measurement

5.10.2.1 Apparent Speed-Over-Ground

Measuring the ping separation distance is completely dependent on the apparent speed-over-ground (SOG). Typically, the apparent SOG matches the true SOG. In this situation the sonar image has a constant 1:1 aspect ratio, since the ping separation distances are valid. However, if the apparent and true SOGs were not matched, then the ping separation distance will not be accurate. The extent of the error depends entirely on the extent of the error between the apparent SOG and the true SOG. For example, if the apparent SOG is set at 3.6 knots and the true SOG is 4.0 knots, there is a 10% error. The ping separation distance is 10% too short because the *Sea Scan PC* “thinks” it is only moving at 3.6 knots instead of the 4.0 knots it is actually moving. The *Sea Scan PC* is not pinging fast enough to maintain the 1:1 aspect ratio for the sonar image. The undersampling will shorten features. Using the given example, the measured area of the shortened feature will be 10% too small.

5.10.3 Measuring Area

5.10.3.1 Overview

You can measure the area of any object, or group of discontinuous objects on the screen using the cursor. An *Area* dialog is used to display the area and select the area measurement tools. The area is displayed using the square of the universal units of length.

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5.10.3.2 Display Area Dialog

elect the *Area* check box in the Sea Scan tool bar to display the Area dialog. The *Area* check box in the Sea Scan tool bar will appear pressed down and backlight with the color white. An *Area* dialog appears that is used to display the area and select the area measurement tools. If necessary, move the dialog so the feature you would like to measure is completely visible. The dialog consists of two sections: the Area Tool bar across the top; and the area display section.

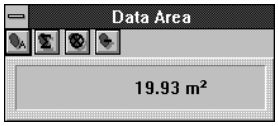

Figure 5-22 Area Measurement Dialog

5.10.3.3 Area Display

The area display section displays the area of the selected objects in the selected units of length. The latest measurement remains displayed until the *Area* dialog is removed or another area measurement is made. This section is also used to display action messages to keep you informed on the progress of any lengthy area calculations.

5.10.3.4 Area Tool Bar

Area Measurement Tools

The *Area* button in the Area tool bar allows you to measure the area of a feature by tracing the outline in the sonar image with the cursor. When this tool is selected, a "base" outlined region is created. This is the starting point for all area measurements, since all the other area tools only allow you to modify the "base" outlined region by either adding or removing regions.

1. Select the *Area* button in the Area tool bar.
2. Place the cursor along the edge of the feature you would like to measure and press the left mouse button. If you attempt to initiate the area measurement process on an invalid line, a sonar record line that does not have any associated range information, the process is aborted.
3. Keeping the left mouse button pressed down, move the mouse along the edge of the feature you would like to measure. A red outline is drawn to indicate the path of the mouse as it is moved to the final position.
4. When at the final position, release the left mouse button. A straight line is drawn from the final position to the initial position to close the outline around the object. A message is displayed in the Area display section informing you the area is being measured. Upon successfully calculating the area, the measured area is displayed in the selected units of measurement. The outlined region used for the area measurement is indicated on the sonar image with a red cross-hatched pattern.

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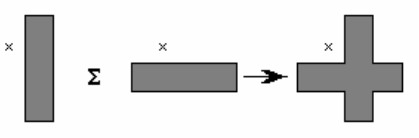
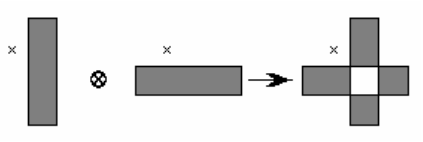
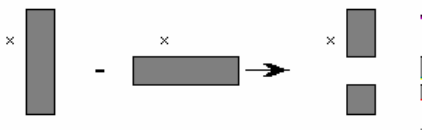
The *Sum Area* button in the Area Tool bar allows you to add additional regions to the existing "base" region used for the area measurement. The process for outlining the region to be added to the "base" region is the same as described above for creating the "base" region itself. Upon outlining the new region, a message is displayed in the Area display section informing you the area is being measured. Upon successfully calculating the area, the measured area is displayed in the selected units of measurement. The region used for the area measurement, which includes the "base" region and the newly outlined region, is indicated on the sonar image with a red cross-hatched pattern.



The *Exclusive-Or Area* button in the Area Tool bar allows you to add additional regions and remove overlapping regions to the existing "base" region used for the area measurement. The process for outlining the region used to modify the "base" region is the same as described above for creating the "base" region itself. Upon outlining the new region, a message is displayed in the Area display section informing you the area is being measured. Upon successfully calculating the area, the measured area is displayed in the selected units of measurement. The region used for the area measurement, which includes an exclusive-or combination of the "base" region and the newly outlined region, is indicated on the sonar image with a red cross-hatched pattern.



The *Subtract Area* button in the Area Tool bar allows you to remove overlapping regions from the existing "base" region used for the area measurement. The process for outlining the region used to modify the "base" region is the same as described above for creating the "base" region itself. Upon outlining the new region, a message is displayed in the Area display section informing you the area is being measured. Upon successfully calculating the area, the measured area is displayed in the selected units of measurement. The region used for the area measurement, which consists of the newly outlined region subtracted from the existing "base" region, is indicated on the sonar image with a red cross-hatched pattern.



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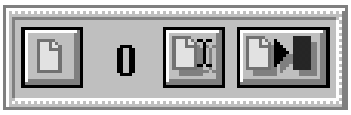
5.11 Object Height Measurement

It is possible to measure the height of a feature from the sonar image if there is a discernible shadow behind the feature. Measuring the height of an object has typically been performed by defining the geometry of the towfish, the object and the object's shadow. The *Sea Scan PC* has automated the object height measurement process. The object height measurement feature is identical to its counterpart in the *Sea Scan PC* program. Please refer to **Object Height Measurement** 79 for more detailed information.

5.11.1 Annotations



To reference a specific feature in the sonar image you may add an annotation. The annotation feature allows you to attach a note on the sonar image much like one would attach a Post-It™ pad note on a hard-copy image. The annotations may be removed and edited at any time. The annotations are marked on the sonar image with the annotation symbol. The display of the annotation symbols may be toggled on and off. The number of active annotations is displayed to the right of the *Toggle Annotation Display* check box. Any changes to the annotations are added to the modification list in the *File Information* dialog. The annotation feature is identical to its counterpart in the *Sea Scan PC* program. Please refer to **4.14 Annotations** (p. 4-60) for more detailed information.

5.12 Saving Data

5.12.1 Overview

At any time, the currently opened data file may be resaved over the original data file, saved to a new data file, or saved as a TIFF. We do not recommend saving over an original raw data file since all of the original data will be lost. If you have made changes to the data file, such as having filtered the entire sonar image, we recommend you save the data under a new filename. Thus, the old original data will still be available.

5.12.2 Data Storage Parameters

The sonar data can be written to disk using a variety of channel resolution and compression modes. The channel resolution mode dictates the amount of the raw data written to disk. The compression mode dictates the level of compression the raw data undergoes when it is written to disk.

NOTE: The use of compression is no longer recommended when saving the data files. The Sea Scan PC application suite no longer supports the compression of .mst data files. Compressed data files are incompatible with most third-party readers such as the MST to XTF and GeoTIFF converters.

For more information on setting the output data parameters refer to **Data Storage Settings** 88.

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5.12.2.1 Saving as Sea Scan PC Data File

Select the Save menu item in the File menu to resave the currently opened data file. The existing filename is used automatically, thus the old data file is written over by any changes that have been made to the opened data file. The entire *Sea Scan PC* data file format is resaved, thus any changes that have been made to the markers and waypoints in the Sea Scan plotter will be updated also.

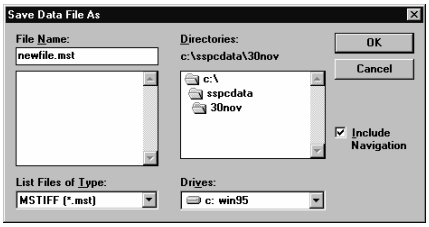

Figure 5-27 Save Data File As Dialog

Select the Save As... menu item in the File menu to save the currently opened data file to a new data file. The *Save Data File As* dialog will appear. Set the *List Files of Type:* list box *to MSTIFF (*.mst)*. You will be prompted to name the file and select a location. You can choose to remove the navigational information from the data file. If the *Include Navigation* option is selected, as indicated by a check mark, the navigational information will be saved with the sonar image data. If the *Include Navigation* option is not selected, in which case the check mark is not present, all traces of navigational information will be removed from the sonar data file. The navigation records, markers, annotations and the survey plotter image are removed.

5.12.3 Saving as TIFF

Select the Save As... menu item in the File menu to save the 1000 line image buffer of the currently opened data file as an uncompressed TIFF file. The *Save Data File As* dialog will appear. Set the *List Files of Type:* list box *to TIFF (*.tif)*. You will be prompted to name the file and select a location. The Sea Scan PC follows the Tag Image File Format (TIFF) Specification Revision 6.0, published by Adobe Systems Inc. in 1992. TIFF v6.0 is a standard file format for images, thus allowing the image buffer to be imported by most third-party image processing applications. You will be able to import the sonar image as a TIFF into most word processors also.

5.13 Group Review

5.13.1 Overview

This feature allows you to review a group of data, such as the entire data set from a survey. You can automate the review process for all the data files in the group. Furthermore, you can create an organized set of GIF images of all the identified targets in the group.

5.13.2 Data File Groups

A computer file system makes use of directories, sometimes referre3d to as folders, to organize the file structure. For example, a default directory based on the current date, is created automatically by the *Sea Scan PC* application to store the data files for that day. The file system allows you to store your data files in an organized and meaningful manner. For example, you can place all the data files from a specific survey in a single directory. Data files located in a directory can be thought of as belonging to a distinct group. This grouping, based on file location in a directory, is the basis for the group review operation. All the *Sea Scan PC* data files in a single directory are considered to be a group. The group review operates on every data file in a selected group.

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5.13.3 Group Review Operation

Select the Group Review… menu item from the Options menu to perform a group review on a complete group of data files. The *Open SSPC Data File* dialog will appear and you will be prompted to select the source directory and the starting file for the group review operation. All of the files in the source directory listed after the starting file in ascending order will be included in the group review operation.

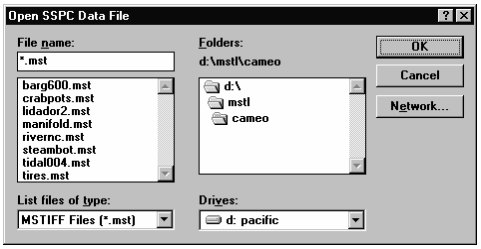

Figure 5-28 Open SSPC Data File Dialog

Upon selecting a valid starting file, the starting file is opened by *Sea Scan PC Review*. The image in the data window is then scrolled so the operator can view the entire image buffer automatically. The slider setting in the *Group Review* dialog determines the scroll speed. The operator can advance to the next file in the group by clicking the Advance button in the *Group Review* dialog.

The group review operation is canceled by explicitly opening a data file. The opening of a data file interrupts the automated group review process, effectively canceling the operation.

5.13.4 Group Review Dialog

You may manage the group review operation by selecting the Group Review Status menu item from the Options menu. This menu command toggles the display of the *Group Review* dialog. The dialog may be moved anywhere on the screen. When the dialog is removed, its position is remembered for the next time the dialog is displayed. The *Group Review* dialog consists of five distinct sections: Action information; MSTIFF Source settings; GIF Destination settings; Advance operation; and scroll speed setting.

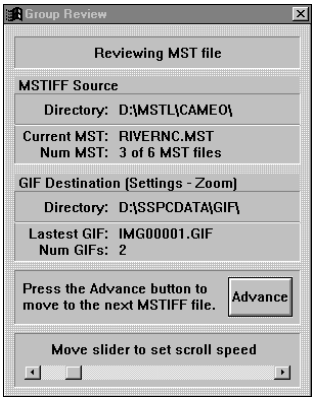

Figure 5-29 Group Review Dialog

Action

This section indicates the current action being performed by the group review process.

MSTIFF Source Settings

Directory

This line indicates the source directory. This is the directory that was selected at the beginning of the group review process. If the entire pathname cannot fit the directory information is truncated so only the drive letter and the last directory name appear on the line.

Current MST

This line indicates the filename of the current MST data file.

Num MST

This line indicates the both the number of the current filename and the total number of MST data files located in the source directory.

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GIF Destination

Directory

This line states the full pathname of the selected destination directory. If the entire pathname cannot fit the directory information is truncated so only the drive letter and the last directory name appear on the line.

Latest GIF

This line indicates the filename of the latest GIF image file that was generated by the group review process.

Num MST

This line indicates the number of GIF image files that have been generated by the current group review process.

Advance Operation

Press the *Advance* button to move to the next MST data file in the source directory. The operator must manually advance to the next MST data file in the group review process. This ensures that an image is not closed before the operator has had the opportunity to review the entire image file.

Scroll Speed Settings

The automatic scroll speed is adjustable. The slider indicates the automatic scroll speed of the group review process. Move the slider to the left to slow down the automatic scroll speed. Alternatively, move the slider to the right to increase the automatic scroll speed.

5.14 Printing Data

5.14.1 Overview

Sea Scan PC Review allows you to print the entire sonar image, or any section of the sonar image, at any size with the default printer. You may specify a custom print image and a custom zoom factor. Print images that do not fit on a single page are printed on multiple pages. Icons in the file information header indicate the relative position of the print image for each page in a multiple page print operation. You may also print the images of the current and survey plotters and a list of the markers currently displayed in the plotter. There is some lose of resolution when printing the image. This is due to the grayscale and resolution limitations of the printer.

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5.14.2 Print Dialog

Sea Scan PC Review allows you to print the entire sonar image, or any section of the sonar image, at any size with the default printer. You may specify a custom print image and a custom zoom factor. Print images that do not fit on a single page are printed on multiple pages. Icons in the file information header indicate the relative position of the print image for each page in a multiple page print operation. You may also print the images of the current and survey plotters and a list of the markers currently displayed in the plotter. There is some lose of resolution when printing the image. This is due to the gray scale and resolution limitations of the printer.

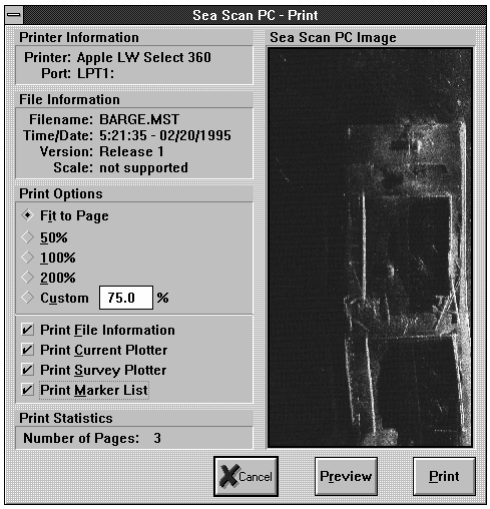

Figure 5-30 Print Dialog

5.14.2.1 Sea Scan PC Image

This section displays a condensed view of the image buffer for the currently opened data file. The condensed view is displayed using the current display parameters for the data window. The selected print image is outlined with a black rectangle. Initially, the entire image is selected as the print image.

5.14.2.2 Printer Information

The name of the default printer and the printer port are displayed in this section. Currently, you cannot set the default printer from within the *Sea Scan PC Review* program. However, the default printer may be set using the Printers control panel. The Printers control panel may be accessed from the Control Panel.

5.14.2.3 File Information

This section displays the file information for the currently opened data file. The complete filename, the date and time the data file was originally stored and the file version are displayed. Currently, the scale feature is not available. The scale is intended to display the conversion from the units used to print the image to the real-world units to the units.

5.14.2.3.1 Print Options

This section allows you to customize the print options. Using the scaling radio buttons, you can size the printed image. To select an option, place the cursor on the corresponding radio button, then press and release the left mouse button. The selected radio button will now appear marked and the previously selected radio button will be cleared. Only one radio button may be selected at any time.

With the magnification percentage set at 100%, the image buffer will fill one page. In order to maintain aspect ratio, the entire width of the printed page is not used. By selecting 50%, the print image will be drawn at one half the size. By selecting 200%, the print image will be drawn at twice the size. In this case, unless you have selected a smaller custom print image, you will likely require multiple pages to print the entire print image. By selecting the *Fit to Page* button, the selected print image will be printed on one page. You may set the magnification percentage to any value by selecting the *Custom* button.

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In addition to the print image, you can chose to print any combination of the following items: the file information at the top of each printed page; the image of the current plotter; the image of the survey plotter; and a list of the current markers and waypoints. To select an item, place the cursor in the corresponding check box, then press and release the left mouse button. A check mark will appear in the check box to indicate the item has been selected to be printed. Likewise, to unselect an item, place the cursor in the corresponding check box, then press and release the left mouse button again. The check mark will now be removed from the check box to indicate that the item will not be printed.

5.14.2.4 Print Statistics

The Print Statistics section displays the number of pages required to print the selected print image and the selected plotter options. The number of pages is updated whenever any print options are modified. The print image will use at least one page. The current and survey plotters when both selected are always printed on the same page use another page. The marker list uses one additional page.

5.14.3 Print Preview Dialog

Select the Preview... button in the Print dialog to preview the print image. The *Sea Scan PC - Print Preview* dialog is displayed allowing you to preview how the default printer will print the selected print image. If multiple pages are required, all of the pages are displayed in the *Print Preview* dialog. Press the *Print* button to print directly from the *Print Preview* dialog, without having to return to the *Print* dialog. Otherwise, press the *Cancel* button to remove the *Print Preview* dialog and return to the *Print* dialog.

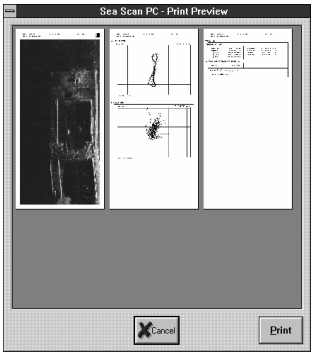

Figure 5-31 Print Preview Dialog

5.14.4 Selecting a Custom Print Image

As stated previously, the current print image is outlined with a black rectangle in the condensed view of the sonar image. By default, the entire sonar image is selected as the print image. However, you may select any section of the sonar image to be printed. There are three methods for selecting a section of the sonar image as the print image. You can either: select a print image with default dimensions; select the entire sonar image as the print image; or you can select a print image with any dimensions up to the size of the entire sonar image.

1. To select a print image with default dimensions, center the cursor over the feature in the sonar image you would like to print. Then press and release the left mouse button without moving the cursor. The black rectangle will outline the new print image with default dimensions centered about the selected feature.

   The selected print image may not extend past the physical edges of the sonar image. In this case, when selecting an object at the edge of the sonar image, the print image edge is set to the sonar image edge and the selected feature is simply off-center in the black selection rectangle.
2. To select the entire sonar image as the print image, place the cursor anywhere in the condensed view of the sonar image. Then double click the left mouse button without moving the cursor. A black rectangle will outline the entire sonar image.
3. Alternatively, you may select a print image of any dimension. Place the cursor on one corner of the section you would like to select. Press the left mouse button and, keeping the left mouse button pressed down, move the mouse to the opposite corner of the section. A black box will be drawn, indicating the selected section, as you move the mouse. Upon releasing the left mouse

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button, a black rectangle is displayed about your selection to indicate the new print image.

5.14.5 Printing the Print Image

Click the *Print* button to print the currently selected print image and plotter options. You may click either the *Print* button in the *Print* dialog or the *Print Preview* dialog. In either case, a dialog is displayed so you can monitor the progress of the printing process. This dialog displays the current status of the printing operation. You can cancel the printing process at any time by clicking the *Cancel* button in this dialog.

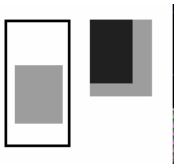
5.14.6 Print Page Layout

Each of the printed pages has a standard layout. The file information header is always at the top of the printed page. The printed image, the current and survey plotters or the marker list will appear below the file information header.

5.14.6.1 File Information Header

If selected, the file information header is at the top of the page. We recommend that the file information be printed since icons in the file information header indicate the relative position of the print image for each page in a multiple page print operation. The filename, the date and time the data file was originally stored and the file version are displayed. The scale indicates the magnification percentage used to print the selected print image. The magnification percentage is selected in the Print Options section of the *Print* dialog. The page number for each page and the total number of pages for a multiple page printing operation are written in the header also.

If the page is printing a section of the print image, a set of icons on the far right side of the file information header provide important location information for each printed page. The left most icon, the white rectangle, represents the entire sonar image. A light gray rectangle indicates the section of the entire sonar image that has been selected as the print image. The right most icon, the light gray rectangle, represents the print image. A black rectangle indicates the section of the print image that is actually printed on each specific page. Thus, for print options that require multiple pages, the relative position of the different sections of the print image that are on different pages are indicated by this set of icons.



5.14.6.2 Print Image

The section of the print image that is being printed on each page is centered on the page. The 1:1 aspect ratio of the sonar image is maintained, thus the far right side of the page is not used. As stated above, the icons on the far right side of the file information header provide the relative position of the print image and the section of the print image that is printed on each specific page.

5.14.6.3 Current and Survey Plotters

The images of the current and survey plotters are printed on a single page. Both of the plotters are enclosed in a separate rectangle on the printed page. The two plotters are identified as either the current or survey plotter in the title bar of the enclosing rectangle.

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5.14.6.4 Marker List

A list of the current markers and waypoints are printed on a single page. The marker list is separated by marker type. The waypoints are listed first, followed by the estimated markers, and then the nadir markers. Please refer to **4.7.5.1 Markers and Waypoints - Overview** (p. 4-24) for more details about the different types of markers. The identifier string, latitude and longitude of each of the markers are listed in double column format.

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Section 6

- **External Devices**

6 External Devices

6.1 Overview

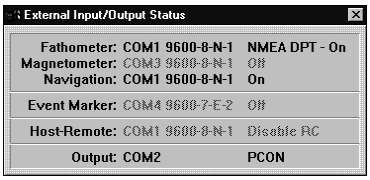
A number of different external devices may be connected to the *Sea Scan PC*. These external devices provide additional information for the sonar operation, such as a GPS receiver that provides navigational information. You do not require a separate serial port for each external device. The output from multiple devices may be read via the same serial port of the *Sea Scan PC* computer.

6.1.1 Monitoring External Devices

A number of different external devices may be connected to the *Sea Scan PC*. These external devices provide additional information for the sonar operation, such as a GPS receiver that provides navigational information. You do not require a separate serial port for each external device. The output from multiple devices may be read via the same serial port of the *Sea Scan PC* computer.

6.1.1.1 Display External Input/Output Status Dialog

Display the *External Input/Output Status* dialog by selecting the Status Boxes|External Devices menu item from the Options menu. This menu command toggles the display of the *External Input/Output Status* dialog. The dialog may be moved anywhere on the screen. When the dialog is removed, its position is remembered for the next time it is displayed. The *External Input/Output Status* dialog consists of two distinct sections: Communications Port Settings and External Device Mode.


External Input/Output Status
Fathometer: COM1 9600-8-N-1 NMEA DPT - On
Magnetometer: COM3 9600-8-N-1 Off
Navigation: COM1 9600-8-N-1 On
Event Marker: COM4 9600-7-E-2 Off
Host-Remote: COM1 9600-8-N-1 Disable RC
Output: COM2 PCON
Figure 6-1 External Input/Output Status box

Communications Port

The Communication Port section displays the current serial port settings for the external devices. If an external device is disabled, the text of the corresponding communication port settings is dimmed. The communication port settings are displayed using the standard format.

External Device Mode

The External Device Mode section displays the current operational mode for the external devices. The text of the corresponding mode is dimmed if the external device is disabled or off. The mode displayed is different for each external device.

6.1.2 Communications Port Settings Display

In all cases, the communication port settings are displayed in a standard format. The serial port is written as *COM#*, where the # represents the serial port. The baud rate is then displayed followed by the number of data bits, parity and the number of stop bits. For example, *COM2 9600- 8- N-1* represents serial port 2, 9600 bits per second, 8 data bits, none parity and 1 stop bit.

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6.1.3 Setting Communications Port Settings

The *Communications Settings* dialog allows you to set the communications settings for the different external devices. Select the *Comm…* button in the *Settings* dialog for each external devices to display the *Communications Settings* dialog. Select the Communications port, Bits per second, Data bits, Parity and Stop bits from the corresponding lists. If two or more external devices share a communication port, the port settings (Bits per second, Data bits, Parity and Stop bits) lists will be disabled. You cannot change the port settings if multiple devices share the port. You can only change the port settings if the selected Communication Port is currently available. Display the *External Input/Output Status* dialog to see the complete list of external devices and their respective communication ports.

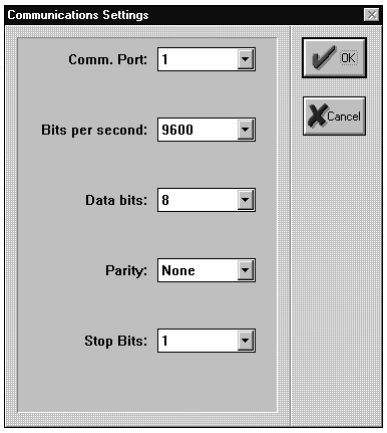

Figure 6-2 Communications Settings Dialog

6.1.3.1 Common Equipment - Connector Cable

All external devices communicate with the *Sea Scan PC* via a serial cable that is connected to a serial port of the *Sea Scan PC* computer. As a minimum, a cable used for serial transmissions from an external device requires a signal line "A" and the shield. Refer to the user's manual for your external device and wire the serial cable appropriately.

1. For a DB-9 serial connector, connect the signal line "A" to pin 2. For a DB-25 serial connector, connect the signal line “A” to pin 3.
2. For a DB-9 serial connector, connect the external device signal ground to pin 5. For a DB-25 serial connector, connect the external device signal ground to pin 7.
3. If the serial cable has a shield or a ”drain” wire, this should be connected to the metal shell of the connector. We highly recommend the use of a serial cable with a shield and a DB-9 or DB-25 connector with a metal shell.

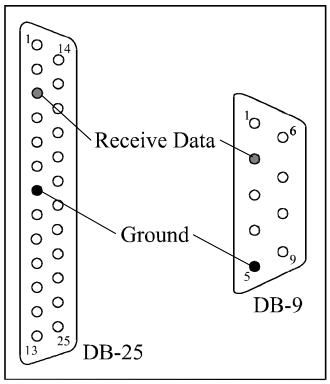

Figure 6-3 Serial Port Connector

Follow standard wiring practices when attaching the connector. If you have any questions, please call the Marine Sonic Technology, Ltd. Technical Support Line.

6.2 Fathometer

6.2.1 Overview

This chapter describes how the *Sea Scan PC* obtains and makes use of water depth information from an external source. An external source, such as a fathometer, determines the current water depth. The external source continuously sends the water depth information over either a serial cable that is connected to a serial port of the *Sea Scan PC* computer or via a MIL-STD-1553A/B data bus. The *Sea Scan PC* is informed when incoming information arrives and then looks for the new water depth

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information. The water depth information is processed for use by the *Sea Scan PC* application.

6.2.2 Water Depth Information

6.2.2.1 NMEA 0183 Sentences

The *NMEA 0183 Standard for Interfacing Marine Electronic Navigational Devices version 2.1* was adopted by the National Marine Electronics Association (NMEA) on October 15, 1995. The NMEA 0183 protocol allows marine instruments to transmit and receive information via a serial cable. This communication between a single *talker* and multiple *listeners* is based on a block transmission. Blocks, or groups of NMEA 0183 sentences, are transmitted over the serial cable. Each sentence has a header that uniquely identifies the *talker* and the information contained in the sentence. A fathometer that supports the NMEA 0183 protocol continuously transmits a valid NMEA 0183 sentence. A serial cable connects the external fathometer (*talker*) to a serial port of the *Sea Scan PC* control computer (*listener*).

The *Sea Scan PC* polls the incoming NMEA 0183 sentences looking for the current water depth information. More specifically, the *Sea Scan PC* looks for the water depth in three valid NMEA 0183 sentences.

DPT: Depth, the standard fathometer depth sentence. This sentence contains two fields: *Water depth relative to the fathometer transducer*; and *Offset distance from the transducer to the water-line*. Adding these two distances provides the total water depth in meters.

DBS: Depth Below Surface, water depth referenced to the surface. This sentence contains the water depth in feet, meters and fathoms. The use of the **DPT** sentence is recommended in place of this sentence.

RAY: Proprietary Raytheon depth sentence. This sentence contains the depth in either feet or meters.

6.2.2.1.1 Proprietary Serial Sentences

NMEA 0183 – DPT (Altitude)

The *Sea Scan PC* application recognizes a special situation for recording both the water depth and altitude using the **DPT** sentence. This proprietary **DPT** sentence is identical to the NMEA 0183 **DPT** sentence. However, the meaning of the fields in the sentence are revised to record the *Sea Scan PC* transducer altitude and depth. The *Water depth relative to the transducer* records the altitude of the *Sea Scan PC* transducers. In other words, this field records the distance from the sea floor to the *Sea Scan PC* transducers. The *Offset distance from the transducer to the water-line* measures the depth of the *Sea Scan PC* transducers. In other words, this field records the distance from the water-line to the *Sea Scan PC* transducers. The proprietary **DPT** sentence is typically provided by an external source, such as a submersible or ROV control system, that knows the vehicle depth from a pressure sensor, vehicle altitude from a down-looking transducer and the relative positions of these sensors to the *Sea Scan PC* transducers.

Proprietary – ODOM Digitrace

The *Sea Scan PC* application recognizes the proprietary depth output of the ODOM Digitrace depth digitizer unit, from Odom Hydrographic Systems. The ODOM standard output data string, transmitted with 8 data bits, none parity and 1 stop bit, contains 11 characters. The depth is transmitted to the hundredths of units.

Proprietary – Geometrics G-880

The *Sea Scan PC* application recognizes the proprietary depth output of the G-880 magnetometer, from Geometrics, Inc. The G-880 provides a calibrated depth measurement in its data stream.

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Please refer to the *G-880 Magnetometer User's Manual* for the recommended method to determine the correct values for the bias and scale depth calibration values. The G-880 magnetometer option must already be selected as the input device in the magnetometer settings for this option to be available.

6.2.2.2 MIL-STD-1553

The *Sea Scan PC* application accepts fathometer data using the MIL-STD-1553 data bus. The MIL-STD-1553 protocol is available from Marine Sonic Technology, Ltd. on request.

6.2.2.3 Water Depth

The NMEA 0183 DPT, DBS and RAY sentences, the proprietary sentences and the MIL-STD-1553 transmission provide the water depth. The water depth is recorded to provide additional information about the survey area. The water depth can be plotted on the Sea Scan plotter. The timestamp for the water depth is also logged enabling the *Sea Scan PC* software to correlate each sonar record line with a water depth.

6.2.2.4 Altitude

The altitude is provided by the Proprietary **DPT (Altitude)** sentence and the MIL-STD-1553 transmission. The altitude is used to preset the *Bottom* slider for the target height calculation in the *Target Identification* dialog. The altitude is also recorded to provide additional information about the survey operation. The timestamp for the altitude is logged enabling the *Sea Scan PC* software to correlate each sonar record line with an altitude.

6.2.3 Sea Scan PC Software

6.2.3.1 Overview

The water depth and altitude provide additional information about the survey operation. The water depth can be plotted on the Sea Scan plotter. When available, the altitude allows for a more automatic target height calculation in the *Target Identification* dialog. Furthermore, if the water depth has been selected in the *Survey File Options* dialog, the fathometer information is logged to both the main survey file and a *.dpt* fathometer survey file. Refer to **Fathometer Survey File** 173 for more information about the fathometer survey file.

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6.2.3.2 Fathometer Settings

Select the Fathometer|Settings menu item in the External menu to set the fathometer settings. The *Fathometer Settings* dialog is displayed. The dialog consists of two sections: the Fathometer section; and the Communication Port section

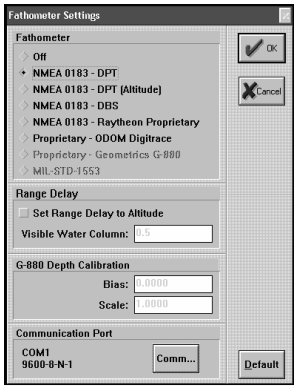

Figure 6-5 Fathometer Settings Dialog

Fathometer

The Fathometer section determines the fathometer input mode. To select a mode, place the cursor on the corresponding radio button, then press and release the left mouse button. The selected radio button will now appear marked and the previously selected radio button will be cleared. Only one radio button may be selected at any time.

If the fathometer is *Off*, the *Sea Scan PC* will not process any incoming transmissions from the fathometer. In other words, even if the external device transmits a valid input sentence, the sentence contents will not be processed unless the fathometer has been enabled. The sentence inputs are described in **Water_Depth_Information** 142. If any of these modes is selected, the fathometer is considered to be enabled. The *Sea Scan PC* polls the incoming sentences looking for the current water depth information.

Communication Port

The *Communication Port* section displays the current serial port settings for the fathometer input. If a serial fathometer input is enabled, select the *Comm…* button to change the serial port settings. The *NMEA 0183 Standard for Interfacing Marine Electronic Navigational Devices version 2.1*, which was adopted by the National Marine Electronics Association (NMEA) on October 15, 1995, recommends serial port parameters of *4800-8-N-1* for data transmission.

6.2.3.3 Testing Communication - Fathometer

Overview

You may test the communications of the external fathometer device by selecting the Fathometer | Test Communications menu item from the External menu. This menu command displays a dialog that displays the serial port settings and checks the availability, composition and integrity of the serial transmissions. The dialog consists of a single *Input* section and the *Log...* and *OK* buttons. To remove the dialog, select the *OK* button or select the Fathometer | Test Communications menu item from the External menu again to return to normal operation.

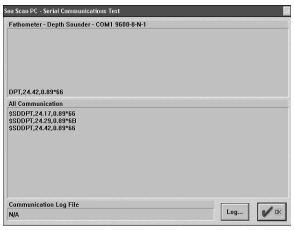

Figure 6-6 Communications Test - Fathometer Dialog

Device and Input Port Settings

The external talker device and the input port settings are displayed in the caption of the *Input* section. The *Sea Scan PC* can identify most types of talker devices. Any unknown talker device will be identified by its NMEA 0183 talker mnemonic.

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Input

The *Input* section displays the input sentences that were available in the latest block transmission from the external source. Although other input sentences may be available, only the sentences that the *Sea Scan PC* is interested in are listed. For NMEA 0183 sentences, the entire sentence strings, minus the *Start of Sentence* and *Talker ID* characters, are written to this group. For MIL-STD-1553 transmissions, the raw data words are written in a waterfall display. This allows you to check the validity of the sentence contents without the *Sea Scan PC* having to attempt to interpret the contents.

Log…

Select the *Log...* button to record the incoming transmissions from the external device for debugging and analysis in a communications log file. You will be prompted by the *Select Communications Log File* dialog to set a filename, preferably with the *.clf* extension, and a destination directory for the communications log file. Upon selection of a valid filename and location, the *Sea Scan PC* will place some header information in the file and then all subsequent incoming transmissions from the external device. The raw information will be logged until you close the *Serial Communications Test* dialog and return to normal operations. This communications log file is very useful for debugging difficulties with external devices.

6.2.3.4 Fathometer Window

The fathometer window displays the total water depth. Select the Fathometer|Display menu item from the External menu to display the fathometer window. This menu command toggles the display of the fathometer window. A check mark will appear next to the Fathometer|Display menu item in the External menu when the fathometer window is visible. The window floats on top of the sonar image and may be moved anywhere on the screen. When the fathometer window is removed, its position is remembered for the next time it is displayed.

Figure 6-7 Fathometer Window

This window displays the current water depth. It is possible that an invalid value is read, or the water depth information is not available for an extended time (more than 10 seconds). Dashes in place of the depth information indicate an invalid (or nonexistent) value. If the water depth information is not available after an extended time, the message *No Data* is displayed. When the next valid water depth is received by the *Sea Scan PC*, the new valid water depth is displayed.

6.2.3.5 Target Identification Dialog - Water Depth

The External Information section of the *Target Identification* dialog displays the surrounding water depth. The water depth at the selected sonar data line is written in the universal units of length and the surrounding water depth is displayed as a topographic profile of the sea floor. The location of the selected sonar data line is indicated with a vertical red bar in the topographic profile. This graphic is intended to provide a visual reference of the surrounding sea floor topography.

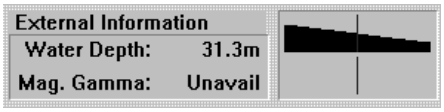

Figure 6-8 Water Depth Display with NMEA 0183 DPT Sentence

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If the altitude information is provided by the external fathometer, then the *Sea Scan PC* transducer altitude is also indicated on the topographic profile. The altitude relative to the water depth is drawn as a horizontal line in the water column. Furthermore, the *Bottom* slider is automatically set to the altitude for the selected sonar data line.

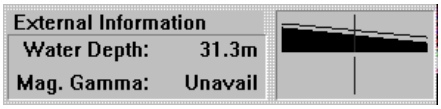

Figure 6-9 Water Depth Display with Proprietary DPT Sentence

6.2.3.6 Training Mode - Simulated Data

In training mode, the *Sea Scan PC* software simulates the serial transmissions from the external fathometer. The water depth and altitude are updated every second. The total water depth is a function of the latitude of the survey vessel. The total water depth increases proportionally with the latitude; however, the value is railed to minimum and maximum values of 17.36 and 56.45 meters respectively. In *NMEA 0183 DPT* mode, the *Offset distance from the transducer to the water-line* field is fixed as 0.89 meters. In *NMEA 0183 DPT (Altitude)* mode, the altitude of the *Sea Scan PC* transducers is directly proportional to the total water depth. The altitude is set as ten percent of the total water depth. The simulated incoming **DPT** sentence is modified according to the current fathometer input mode.

6.3 Magnetometer

6.3.1 Overview

This chapter describes how the *Sea Scan PC* obtains and makes use of geomagnetic information from an external source. An external source, such as a magnetometer, determines the current total magnetic field. The external source continuously sends the geomagnetic information over a serial cable that is connected to a serial port of the *Sea Scan PC* computer. The *Sea Scan PC* is informed when incoming information arrives and then looks for the new geomagnetic information. The geomagnetic information is processed for use by the *Sea Scan PC* application.

6.3.2 Geomagnetic Information

6.3.2.1 ASCII

The *Sea Scan PC* application recognizes a simple ASCII sentence that contains the total geomagnetic field reading in gammas from the magnetometer. A sample serial transmission is as follows:

47834.5<CR><LF>
47835.3<CR><LF>
47834.9<CR><LF>

This simple ASCII sentence is typically provided by older magnetometers with limited on-board processing.

6.3.2.2 Geometrics G-866

The *Sea Scan PC* application recognizes the serial output of the G-866 magnetometer from Geometrics, Inc. The G-866 provides the total magnetic field reading in tenths of gammas. The *Sea Scan PC* converts the magnetic field reading to gammas.

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6.3.2.3 Geometrics G-880

The *Sea Scan PC* application recognizes the serial output of the G-880 magnetometer from Geometrics, Inc. Although the G-880 is capable of concatenating the readings from multiple magnetometers, the *Sea Scan PC* is only capable of accepting the first reading.

NOTE: The G-880 transmission rate must be set to no more than two readings per second. The *Sea Scan PC* is not able to keep up with the geomagnetic readings from the G-880 at the faster data rates. Please refer to the *G-880 Magnetometer User's Manual* for the recommended method to slow down the rate of the G-880 data transmissions.

6.3.2.4 J.W. Fisher Proton 4

The *Sea Scan PC* application recognizes the serial output of the Proton-4 magnetometer from J.W. Fishers The Proton-4 provides the total magnetic field reading in gammas and is read directly by *Sea Scan PC.*

6.3.2.5 Marine Magnetics SeaSPY

The *Sea Scan PC* application recognizes the serial output of the SeaSPY and Explorer magnetometer from Marine Magnetics. The SeaSPY and Explorer magnetometers provide the total magnetic field reading in gammas and is read directly by *Sea Scan PC.* *Sea Scan PC* is capable of reading the Standard, Compact and SIS-1000 compatible data formats. This is handled automatically when *Sea Scan PC* is set to read SeaSPY data.

6.3.3 Sea Scan PC Software

6.3.3.1 Overview

The total geomagnetic field provides additional information about the survey operation. The total geomagnetic field value is plotted on the Sea Scan magnetometer strip chart window. Furthermore, if the magnetometer parameters have been selected in the *Survey File Options* dialog, the total geomagnetic field readings are logged to both the main survey file and a *.mag* magnetometer survey file. Refer to **Magnetometer Survey File** 174 for more information about the magnetometer survey file.

6.3.3.2 Magnetometer Settings

The total geomagnetic field provides additional information about the survey operation. The total geomagnetic field value is plotted on the Sea Scan magnetometer strip chart window. Furthermore, if the magnetometer parameters have been selected in the *Survey File Options* dialog, the total geomagnetic field readings are logged to both the main survey file and a *.mag* magnetometer survey file. Refer to **Magnetometer Survey File** 174 for more information about the magnetometer survey file.

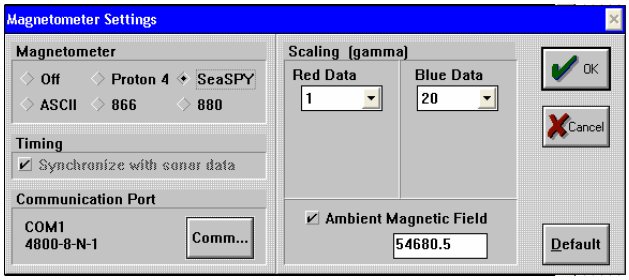

Figure 6-10 Magnetometer Settings Dialog

Magnetometer

The Magnetometer section determines the magnetometer input mode. To select a mode, place the

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cursor on the corresponding radio button, then press and release the left mouse button. The selected radio button will now appear marked and the previously selected radio button will be cleared. Only one radio button may be selected at any time.

If the magnetometer is *Off*, the *Sea Scan PC* will not process any incoming transmissions from the magnetometer. In other words, even if the external device transmits a valid input sentence, the sentence contents will not be processed unless the magnetometer has been enabled. The sentence inputs are described in **Geomagnetic Information** 146. If any of these modes is selected, the magnetometer is considered to be enabled. The *Sea Scan PC* polls the incoming sentences looking for the total geomagnetic field reading.

Timing

The Timing section is currently disabled. The display geomagnetic field reading in the magnetometer strip chart is always synchronized with the sonar data display in the data window.

Scaling

The Scaling section allows the operator to set the default scales and the ambient magnetic field for the magnetometer strip chart. The difference between the current total geomagnetic field reading and the ambient magnetic field is displayed in the magnetometer strip chart at two scales: red and blue. Each vertical line in the strip chart represents unit in gammas as determined by the *Red Data* and *Blue Data* selections. The default ambient magnetic field may be entered at this point. If the ambient magnetic field is not known the average total geomagnetic field may be used as the ambient magnetic field. Refer to **Geomagnetic Field Data Display** 149 for information on how to quickly reset the value used for the ambient field while collecting the geomagnetic readings.

Communication Port

The *Communication Port* section displays the current serial port settings for the magnetometer input. If a magnetometer input is enabled, select the *Comm…* button to change the serial port settings. Please refer to the *G-880 Magnetometer User's Manual* for the recommended serial port settings.

6.3.3.3 Testing Communication - Magnetometer

Overview

You may test the communications of the external magnetometer device by selecting the Magnetometer | Test Communications menu item from the External menu. This menu command displays a dialog that displays the serial port settings and checks the availability, composition and integrity of the serial transmissions. The dialog consists of a single *Input* section and the *Log...* and *OK* buttons. To remove the dialog, select the *OK* button or select the Magnetometer | Test Communications menu item from the External menu again to return to normal operation.

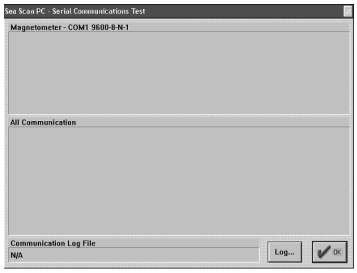

Figure 6-11 Communications Test - Magnetometer Dialog

Input Port Settings

The input port settings are displayed in the caption of the *Input* section.

Input

The *Input* section displays the sentences received from the external source in a waterfall display. This allows you to check the validity of the sentence contents without the *Sea Scan PC* having to attempt to interpret the contents.

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Log…
Select the *Log...* button to record the incoming transmissions from the external device for debugging and analysis in a communications log file. You will be prompted by the *Select Communications Log File* dialog to set a filename, preferably with the *.clf* extension, and a destination directory for the communications log file. Upon selection of a valid filename and location, the *Sea Scan PC* will place some header information in the file and then all subsequent incoming transmissions from the external device. The raw information will be logged until you close the *Serial Communications Test* dialog and return to normal operations. This communications log file is very useful for debugging difficulties with external devices.

6.3.3.4 Magnetometer Strip Chart Window

The magnetometer strip chart window displays the geomagnetic readings. The magnetometer strip chart is displayed automatically when one of the magnetometer input devices is selected. The window is located to the right of the sonar data window and is positioned so the vertical location of the geomagnetic reading matches the vertical location of the matching sonar image data on the screen. The *Sea Scan PC* synchronizes the display of the sonar image data and the geomagnetic readings based on time.

The magnetometer strip chart window consists of two sections: Scaling section and the Data section.

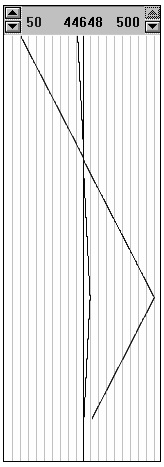

Figure 6-12 Magnetometer Strip Chart Window

Scaling

The magnetometer readings are displayed at two separate scales: red and blue. The Scaling section displays the unit values in gammas for the two scales. The red scale is displayed to the left and the blue scale is displayed to the right in the Scaling section. By convention, the red scale is always less than the blue scale. In the Data Display section a gray vertical line indicates each scale unit.

Increment the red and blue scales by pressing the corresponding up arrow button in the Scaling section. For example, the scale will be increased from 50 to 100 gammas when the up arrow button is pressed once.

Decrement the red and blue scales by pressing the corresponding down arrow button in the Scaling section. For example, the scale will be decreased from 50 to 20 gammas when the down arrow button is pressed once.

Current Geomagnetic Field Reading

The current geomagnetic field reading is displayed in gammas in the center of the Scaling section.

Geomagnetic Field Data Display

The Data Display section displays the geomagnetic field data. Depending on the screen resolution the number of vertical pixels may vary. Similar to the sonar image data display not all of the lines in the strip chart can be displayed on the screen at the same time. However, synchronized with the sonar image data display, you may view the entire strip chart by scrolling up or down with the vertical scroll bar.

The dark centerline in the data display section indicates the current ambient geomagnetic field value. The current geomagnetic field reading is plotted relative to the ambient geomagnetic field. The

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ambient geomagnetic field is set in the *Magnetometer Settings* dialog. However, it is also possible for the operator to reset the ambient geomagnetic field based on the last ten magnetic field readings. Using the left mouse button, click once on the current geomagnetic field reading in the Scaling section to reset the ambient geomagnetic field. The geomagnetic readings in the strip chart will be replotted based on the adjusted ambient field.

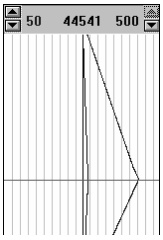
6.3.3.5 Plotter - Magnetometer Markers

The Sea Scan plotter, sonar image data display and magnetometer strip chart are closely related. When the navigational information is available, the source of each magnetometer reading can be correlated with an associated position. Thus any magnetic anomaly seen in the strip chart can be associated with both a swath line in the sonar image and a known position. The estimated position calculation will take into account the layback of the magnetometer.

This is a powerful tool for marking site location. The operator may scroll through the strip chart data display, identify a magnetic feature or interest and then mark the estimated location of the magnetometer on the plotter.

Marking a Magnetic Feature

To mark a feature on the magnetometer strip chart place the cursor at the feature in the strip chart. Then double click the left mouse button by quickly pressing and releasing the left mouse button twice. The information for the selected feature in the magnetometer strip chart record is logged in the marker list. The selected feature is indicated in the magnetometer strip chart with a horizontal green line. The location of the selected feature is marked on the Sea Scan plotter with a magnetometer marker if it is within the plotter boundary coordinates. The magnetometer marker is a black 'M' surrounded by a red box as shown to the left. The combined number of markers and waypoints is updated in the status window.



Removing a Magnetometer Marker

The operator cannot remove a magnetometer marker, as indicated by a horizontal green line, from within the magnetometer strip chart. The magnetometer marker must be removed from within the Sea Scan plotter. Please refer to **4.7.5.8 Marker and Waypoint Delete** (p. 4-29) for information on how to remove a marker from the Sea Scan plotter. When a magnetometer marker is removed in the Sea Scan plotter, the corresponding horizontal green line is removed from the magnetometer strip chart.

6.3.3.6 Target Identification Dialog - Magnetometer Reading

The External Information section of the *Target Identification* dialog displays the surrounding geomagnetic field readings. The geomagnetic field reading at the selected sonar data line is written in gammas and the surrounding geomagnetic field is displayed in a normalized horizontal strip chart. The location of the selected sonar data line is indicated with a vertical red bar in the strip chart. This graphic is intended to provide a visual reference of the surrounding geomagnetic field.

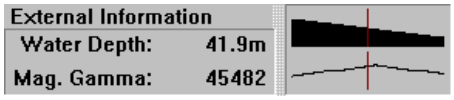


Figure 6-13 Geomagnetic Field Display

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6.4 Navigation

6.4.1 Overview

This chapter describes how the *Sea Scan PC* obtains and makes use of navigational information from an external source. An external source, such as a GPS (Global Positioning System) receiver, determines the current geographic position and calculates related navigational information such as speed and course-over-ground. The external source continuously sends the navigational information over either a serial cable that is connected to a serial port of the *Sea Scan PC* computer or via a MIL-STD-1553A/B data bus. The *Sea Scan PC* is informed when an incoming transmission arrives and then looks for the new navigational information. The navigational information is processed for use by the *Sea Scan PC* application.

6.4.2 Navigational Information

6.4.2.1 NMEA 0183 Sentences

The *NMEA 0183 Standard for Interfacing Marine Electronic Navigational Devices version 2.1* was adopted by the National Marine Electronics Association (NMEA) on October 15, 1995. The NMEA 0183 protocol allows marine instruments to transmit and receive information via a serial cable. This communication between a single *talker* and multiple *listeners* is based on a block transmission. Blocks, or groups of NMEA 0183 sentences, are transmitted over the serial cable. Each sentence has a header that uniquely identifies the *talker* and the information contained in the sentence. An external GPS that supports the NMEA 0183 protocol continuously transmits at least the minimum implementation of sentences. A serial cable connects the external GPS (*talker*) to a serial port of the *Sea Scan PC* control computer (*listener*).

The *Sea Scan PC* polls the incoming NMEA 0183 sentences looking for the current navigational information. The *Sea Scan PC* looks for the navigational information in the following sentences:

RMC: Recommended Minimum Specific GPS/TRANSIT Data
RMA: Recommended Minimum Specific Loran-C Data
GGA: Global Positioning System Fix Data
GLL: Geographic Position – Latitude/Longitude
VTG: Course Over Ground and Ground Speed
HDT: Heading, True
GTD: Geographical Position – Loran-C Time Delays

The *Sea Scan PC* allows you to reset the computer system clock based on the external GPS time provided by the **ZDA**, Time & Date sentence.

6.4.2.2 MIL-STD-1553

The *Sea Scan PC* application accepts navigational information using the MIL-STD-1553 data bus. The MIL-STD-1553 protocol is available from Marine Sonic Technology, Ltd. on request.

6.4.2.3 Latitude and Longitude

The latitude and longitude (L/L) pair is provided by the NMEA 0183 **RMA**, **RMC**, **GGA** and **GLL** sentences and the MIL-STD-1553 transmission. The L/L pair is always expressed in degrees, decimal minutes, and the hemisphere (DD MM.MMM N,S,E or W). The L/L pair is used to plot the survey vessel's current position on the Sea Scan plotter. The timestamp for the L/L position is also logged enabling the *Sea Scan PC* software to correlate each sonar record line with a L/L position. See **Plotter-Sonar Image Interaction** 55 for more information on the plotter and sonar image interaction.

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In the *Sea Scan PC* software, when the L/L pair is available from the external source, the position is displayed in the information window. The position is also displayed in the information window of the Sea Scan plotter. It is possible that an invalid L/L pair is read, or the L/L pair is not available for an extended time (more than 10 seconds). An invalid (or nonexistent) L/L pair is indicated by writing dashes in place of the position information.

If the L/L pair is not available after an extended time, a time out message is displayed. In NMEA 0183 mode, the message *No NMEA Lat-Long Data* or *No NMEA Nav Data*, depending on the state of the other navigation information, is displayed. In MIL-STD-1553 mode, the message *No 1553 Nav Data* is displayed. The new valid position is displayed when the next valid L/L pair is received by the *Sea Scan PC*.

6.4.2.4 Speed-Over-Ground

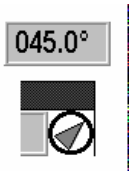
The speed-over-ground (SOG) is provided by the NMEA 0183 **RMA**, **RMC**, **VTG** sentences and the MIL-STD-1553 transmission. In the *Sea Scan PC* software the SOG from the external source is used to set the ping rate of the transducers automatically. This maintains a constant 1:1 aspect ratio for the sonar image data automatically. Please refer to **Speed Control** 37 for more information.

In the *Sea Scan PC* software, when the SOG is available from the external source it is displayed in the information window. It is also displayed in the information window of the Sea Scan plotter. It is possible that an invalid SOG is read, or the SOG is not available for an extended time (more than 10 seconds). In either case the invalid (or nonexistent) SOG is not processed or displayed. The latest valid SOG will continue to be used to calculate the ping rate of the transducers. When the next valid SOG is received by the *Sea Scan PC*, the new valid SOG is displayed and used to set the new transducer ping rate. When the SOG is consistently invalid, for any reason, it may be desirable to switch to manual SOG mode. Press the *Manual SOG* button in the Sea Scan tool bar to stop looking for the SOG in the incoming transmissions. The button will appear pressed down and backlight with the color red. You must manually match the apparent speed with the vessel's actual speed to maintain a constant 1:1 aspect ratio for the sonar image. Please refer to **Speed Control** 37 for more information.

6.4.2.5 Course-Over-Ground

The course-over-ground (COG) is provided by the NMEA 0183 **RMA**, **RMC**, **VTG** sentences. The COG is written in true degrees. The COG from the external source is used to update the estimated swath coverage in the Sea Scan plotter. A timestamp is logged for each COG enabling the *Sea Scan PC* to correlate each sonar record line with a heading. Thus the *Sea Scan PC*, with the L/L, is able to correlate features in the sonar image with a valid L/L position based on the axial distance from the transducers. See **4.7.12 Plotter-Sonar Image Interaction** (p. 4-33) for more information on the plotter and sonar image interaction.

When the COG is available from the external source it is displayed in the information window in numeric format (0-359°). It is also displayed graphically, as a ship in a compass rosette with north always as up, in the information window of the Sea Scan plotter.



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It is possible that an invalid COG is read, or the COG is not available for an extended time (more than 10 seconds). In either case the invalid (or nonexistent) COG is not processed or displayed. The latest valid COG will continue to be used to update the estimated swath coverage and also be used as the heading for subsequent sonar record lines to correlate features in the sonar image with a L/L position. When the *Sea Scan PC* receives the next valid COG, it is displayed and used to update the estimated swath coverage.

6.4.2.6 Time Delays

The time delays (TDs) are provided by the NMEA 0183 **RMA** and **GTD** sentences. When the external navigational device is a Loran C unit, the primary and secondary TDs are recorded with the other navigational information. The recording of the TDs is a background process. You do not control the TD logging process. The TDs are not used by the *Sea Scan PC* software and are only logged for reference in the navigational information.

6.4.2.6.1 Heading

In some specialized cases the actual heading of the transducers can be determined. If this heading is different from the survey vessels course-over-ground, the heading should be provided in the NMEA 0183 **HDT** sentence. The heading is also provided by the MIL-STD-1553 transmission. In these cases, the heading instead of the COG is used to update the estimated swath coverage and for all target position calculations along the estimated swath lines.

6.4.2.7 Time

The NMEA 0183 **ZDA** sentence may be used to synchronize the internal clock of the *Sea Scan PC* computer with an external source. When the NMEA 0183 **ZDA** sentence is received, the internal clock of the *Sea Scan PC* is reset based on the new time and date. Be sure that the time zone environment variable is set on the host operating system. If the time zone environment variable is not set, the computer's time may be set incorrectly . For more information on setting the time zone environment variable please refer to **Setting the Time Zone** 181 in the Appendices.

6.4.3 Sea Scan PC Software

6.4.3.1 Overview

The *Sea Scan PC* software makes extensive use of the navigational information provided by the external source. The navigational information is seminal to the proper operation of the *Sea Scan PC*.

The latitude/longitude pair is used to plot the survey vessel's current position on the Sea Scan plotter. The SOG is used to set the ping rate of the transducers in order to maintain a constant 1:1 aspect ratio for the sonar image data automatically. The COG is used to update the estimated swath coverage in the Sea Scan plotter. With both the latitude/longitude pair and the COG or heading, the *Sea Scan PC* is able to correlate features in the sonar image with a valid latitude/longitude position based on the axial distance from the transducers. See **Plotter** 38 for more information about the use of the navigational information in the *Sea Scan PC*. Furthermore, the navigational information is automatically logged to the survey file. Refer to **Survey Files** 91 for more information about the survey file.

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6.4.3.2 Navigation Settings

Select the Navigation|Settings menu item in the External menu to set the Navigation Input settings. The *Navigation Input Settings* dialog is displayed. The dialog consists of three sections: the Navigation Input section; the COG Display section; and the Communication Port section.

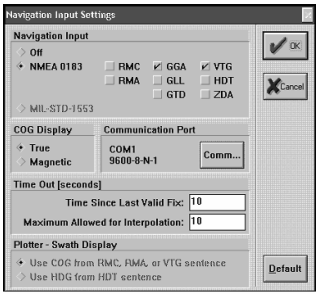

Figure 6-14 Navigation Input Settings Dialog

Navigation Input

The *Navigation Input* section determines which NMEA 0183 sentences are enabled by the *Sea Scan PC*. To enable a specific input mode, place the cursor on the corresponding radio button, then press and release the left mouse button. The selected radio button will now appear marked and the previously selected radio button will be cleared. Only one radio button may be selected at any time.

If the Navigation Input is set to *Off*, the *Sea Scan PC* will not process any incoming transmissions of the sentence. In other words, even if the external GPS transmits navigational information, the sentence contents will not be processed.

If the Navigation Input is set to *NMEA 0183*, the sentence check boxes will be available for selection. To enable an NMEA 0183 sentence, place the cursor on the corresponding check box, then press and release the left mouse button. A check mark will appear in the check box when the sentence is enabled. If a specific sentence is not enabled, *Sea Scan PC* will not process any incoming transmissions of that specific sentence. In other words, even if the external GPS transmits the specific sentence, the sentence contents will not be processed unless the sentence has been enabled. Each NMEA 0183 sentence provides a different set of navigational information as follows:

RMC: Latitude and Longitude, SOG, COG
RMA: Latitude and Longitude, SOG, COG, Time Delays
GGA: Latitude and Longitude
GLL: Latitude and Longitude
GTD: Time Delays
VTG: SOG, COG
HDT: Heading
ZDA: Time

If the Navigation Input is set to *MIL-STD-1553*, the Sea Scan PC will attempt to receive the navigational information from the MIL-STD1553A/B data bus.

COG Display

If any of the NMEA 0183 sentences that provide Course-Over-Ground are enabled, the *COG Display* section allows you to determine the COG display mode. The COG display mode affects the numeric and graphical displays of the COG in the *Sea Scan PC* software. This includes the information window, *Rng/Bearing* and *Track Survey* dialogs. If *True COG* is enabled the ship is gray in the compass rosette display. Otherwise, the ship is dark blue if the *Magnetic COG* display mode is enabled.

Communication Port

The Communication Port section displays the current serial port settings for the navigation input. If at least one of the NMEA 0183 sentences in the Navigation Input section is enabled, select the *Comm…*

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button to change the serial port settings. See **Setting Communications Port Settings** 141 for more information on changing the serial port settings for an external device. The *NMEA 0183 Standard for Interfacing Marine Electronic Navigational Devices version 2.1*, which was adopted by the National Marine Electronics Association (NMEA) on October 15, 1995, recommends serial port parameters of *4800-8-N-1* for data transmission.

Time Out

The Time Out section allows the adjustment of the time out values used in maintaining constant navigation data for the operator's use. The *Time Since Last Valid Fix* specifies the amount of time in seconds that Sea Scan PC will wait until it decides that there is no valid navigation data being received. The default is 10 seconds. If a navigation string is received in more than this time out or if there is no navigation data for this time out, Sea Scan PC will mark the incoming image data as having no valid navigation fixes. This will hinder the operator's ability to place markers on targets. It is advisable to leave this set at the default value unless you have relatively spotty navigation data.

The Time Out section also allows the adjustment of the amount of time that Sea Scan PC will interpolate (or in other words, intelligently guess) the current navigational fixes. For GPS's that put out a navigation fix every two seconds this time out would be at least 2 seconds. It is advisable to leave this set at the default value of 10 seconds unless you have relatively spotty navigation data.

Plotter - Swath Display

The Plotter - Swath Display section allows the user to choose between Course Over Ground and Heading for the swath display in the plotter. Please refer to **Plotter** 38 under the **Sea Scan PC Software** 19 section for information on the swath display. Choose the *Use COG from RMC, RMA, or VTG sentence* to use Course Over Ground to point your swath display. Choose the *Use HDG from HDT sentence* to use Heading to point your swath display. If you choose to use heading make sure that you have selected to receive the HDT sentence from your GPS or navigational input device and in fact that that device is sending that sentence out and is being received properly.

6.4.3.2.1 Testing Communication - Navigation

Overview

You may test the communications of the external navigation device by selecting the Navigation | Test Communications menu item from the External menu. This menu command displays a dialog that displays the serial port settings and checks the availability, composition and integrity of the serial transmissions. The dialog consists of a single Input section and the *Log...* and *OK* buttons. To remove the dialog, select the *OK* button or select the Navigation | Test Communications menu item from the External menu again to return to normal operation.

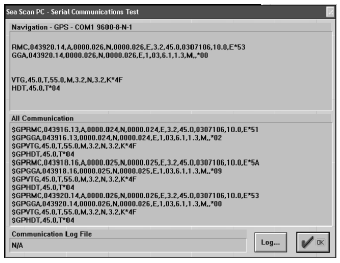

Figure 6-15 Communications Test - Navigation Dialog

Device and Serial Port Settings

The external talker device and the input port settings are displayed in the caption of the Input section. The *Sea Scan PC* can identify most types of talker devices. Any unknown talker device will be identified by its NMEA 0183 talker mnemonic.

Input

The Input section displays the input sentences that were available in the latest block transmission from

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the external source. Although other input sentences may be available, only the sentences that the *Sea Scan PC* is interested in are listed. The NMEA 0183 sentences **RMA**, **RMC**, **GGA**, **GLL**, **VTG**, **HDT**, and **ZDA** are listed. The entire sentence strings, minus the *Start of Sentence* and *Talker ID* characters, are written to this group. For MIL-STD-1553 transmissions, the raw data words are written in a waterfall display. This allows you to check the validity of the sentence contents without the *Sea Scan PC* having to attempt to interpret the contents.

Log…

Select the *Log...* button to record the incoming transmissions from the external device for debugging and analysis in a communications log file. You will be prompted by the *Select Communications Log File* dialog to set a filename, preferably with the *.clf* extension, and a destination directory for the communications log file. Upon selection of a valid filename and location, the *Sea Scan PC* will place some header information in the file and then all subsequent incoming transmissions from the external device. The raw information will be logged until you close the *Serial Communications Test* dialog and return to normal operations. This communications log file is very useful for debugging difficulties with external devices.

6.4.3.3 Training Mode -Simulated Data

In training mode, the *Sea Scan PC* software simulates the serial transmissions from the external GPS. The latitude and longitude (L/L), the speed-over-ground (SOG) and the course-over-ground (COG) are updated every second. The ship starts at the intersection of the equator and the prime meridian (0 ° 00.00N 0° 00.00E). It then travels northeast along a straight lane with a course of 45° . The ship then executes a 180° turn to the right and continues southwest along an adjacent lane. The ship then executes another 180° turn but to the left and continues northeast along an adjacent lane. It will continue this northeast then southwest lane pattern indefinitely. The simulated speed will speed up in the turns to mimic the proper turning procedure.

The L/L is extrapolated from the previous L/L based on the speed and the COG. Thus, if you chose to ignore the simulated SOG and set the apparent SOG manually, the ship will appear to move faster. In other words, the L/L responds to the value of the apparent SOG, as set by either the simulated SOG or manually by you. The simulated navigational information is not meant to represent a true ship's track, but merely to supply simulated L/L, SOG and COG.

6.5 Event Marker

6.5.1 Overview

This chapter describes the event marker feature in the *Sea Scan PC* software. An event marker indicates a specific sonar data line within the sonar image. Event markers are an extension of the annotation feature in the *Sea Scan PC* software. You can edit and delete event markers in the exact same manner as the standard annotations in the sonar image. See **Annotations** 82 for more information about annotations. The event marker, alternating red and white lines, appears along the right side of the sonar image. Event markers may be placed in the sonar image automatically based on distance traveled or an external device may be used to trigger an event marker.

Figure 6-16 Event Marker

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6.5.2 Event Trigger Sentence

6.5.2.1 Standard Event Trigger Sentence

A valid event trigger sentence is any ASCII sentence that contains the word *EVENT*. The external device that provides the event trigger sentence may be another computer or a simple box that is capable of transmitting an ASCII event trigger sentence. The *Sea Scan PC* polls the event marker communications port looking for the trigger sentence. For example, *EVENT1<CR><LF>* is a valid trigger sentence. The *Sea Scan PC* ignores the *1* in the sentence and only cues on the *EVENT*. *EVE<CR><LF>* is not a valid trigger sentence since it does not contain the complete word *EVENT*.

6.5.2.2 Numbered Event Trigger Sentence

It is possible to include an identification number with the event trigger sentence. The identification number is automatically included in the comment field of the event annotation. To include an identification number in the event trigger sentence, add the text *,A######* after the *EVENT* field, where ###### is the five digit identification number. For example, *EVENT,A00125<CR><LF>* is a valid numbered event trigger sentence. The *Sea Scan PC* automatically includes 125, the identification number, in the comment field of the resulting event annotation. The identification number must contain five digits and be zero-padded.

6.5.3 Sea Scan PC Software

6.5.3.1 Overview

The event markers can be placed in the sonar image automatically. In this case, an event marker is placed in the sonar image at a prescribed distance interval. Alternatively, an external device may be used to trigger an event marker to indicate any aspect of the sonar image such as the start and end of a survey leg. The external source periodically sends an event trigger sentence over a serial cable that is connected to a serial port of the *Sea Scan PC* computer. The *Sea Scan PC* is informed when an incoming serial transmission arrives and then looks for the trigger signal. Upon receiving the trigger signal, the *Sea Scan PC* places an event marker at the current sonar data line.

6.5.3.2 Event Marker Settings

Select the Event Marker | Settings menu item in the External menu to set the event marker settings. The *Event Marker Settings* dialog is displayed. The dialog consists of three sections: the Mode section; the Automatic Event Interval section; the Automatically Include section; and the Communication Port section.

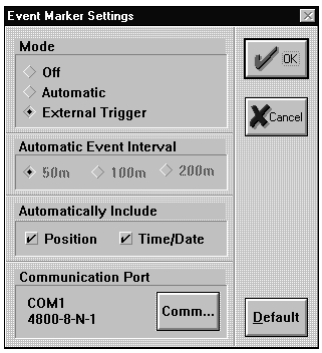

Figure 6-17 Event Marker Settings Dialog

Mode

The Mode section determines the event marker mode. To select a mode, place the cursor on the corresponding radio button, then press and release the left mouse button. The selected radio button will now appear marked and the previously selected radio button will be cleared. Only one radio button may be selected at any time.

In *Off* mode, the *Sea Scan PC* will not add any event markers. The *Sea Scan PC* will not process any incoming transmissions from an external event trigger device. In other words, even if the external device transmits an event trigger sentence, the sentence contents will not be processed unless the event marker mode is set to *External Trigger*.

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In *Automatic* mode, the *Sea Scan PC* will add event markers to the sonar image automatically. Event markers are placed in the sonar image at prescribed distance intervals.

In *External Trigger* mode, an external device may be used to trigger the placement of an event marker in the sonar image. Upon receiving the trigger signal, the *Sea Scan PC* places an event marker at the current sonar data line.

Automatic Event Interval

The *Automatic Event Interval* allows you to set the distance at which an event marker is placed in the data automatically. The distance traveled, which is used to determine the placement of the event markers, is an internal calculation based on the apparent speed-over-ground. See **Speed Control** 37 for more information about the apparent and true speed-over-ground.

Automatically Include

The *Sea Scan PC* can include the current location and date/time in the comment field of the event annotation. To enable an event annotation option, place the cursor on the corresponding check box, then press and release the left mouse button. A check mark will appear in the check box when the option is enabled.

Communication Port

The *Communication Port* section displays the current serial port settings for the external trigger device. If the *External Trigger* mode is enabled, select the *Comm…* button to change the serial port settings. See **Setting Communications Port Settings** 141 for more information on changing the serial port settings for an external device.

6.5.3.3 Testing Serial Communciation - Event Marker

Overview

You may test the serial communications of the external event trigger device by selecting the Event Marker|Test Communications menu item from the External menu. This menu command displays a dialog that displays the serial port settings and checks the availability, composition and integrity of the serial transmissions. The dialog consists of a single Input section and the *Log...* and *OK* buttons. To remove the dialog, select the *OK* button or select the Event Marker|Test Communications menu item from the External menu again to return to normal operation.

Serial Port Settings

The serial port settings are displayed in the caption of the Input section.

Input

The Input section displays a scrolling list of the input sentences that have been received from the external event trigger device. Each event sentence is suffixed with an identification number

Log…

Select the *Log...* button to record the incoming serial transmissions from the external device for debugging and analysis in a communications log file. You will be prompted by the *Select Communications Log File* dialog to set a filename, preferably with the *.clf* extension, and a destination directory for the communications log file. Upon selection of a valid filename and location, the *Sea Scan PC* will place some header information in the file and then all subsequent incoming transmissions from the external device. The raw information will be logged until you close the *Serial Communications Test* dialog and return to normal operations. This communications log file is very useful for debugging difficulties with external devices.

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6.6 Host Remote

6.6.1 Overview

The Host-Remote feature allows a self-contained *Host Sea Scan PC* system to be controlled by a *Remote* computer via an RS232 serial line. This feature allows a self-contained *Sea Scan PC* system to be included on autonomous vehicles and other underwater vehicles that can only be controlled remotely. The *Host* accepts control commands from the *Remote* and transmits status information to the *Remote*. The *Remote* computer must be capable of transmitting ASCII commands and receiving status information from the *Host* over the same RS232 serial line.

The communication protocol between the *Host* and *Remote* is outlined in the *Sea Scan PC HOST-REMOTE Serial Communications Protocol Reference Manual*. The communication interface is modeled after the NMEA 0183 communications protocol. It provides for flexibility in command control and an adequate level of transmission error detection. Furthermore, the use of the proprietary sentence allowed in the NMEA 0183 communications protocol allows the *Remote* to piggyback the control command sentences with input from other external devices, such as navigational input.

6.6.2 Sea Scan PC Software

6.6.2.1 Overview

In Host-Remote mode, the *Host Sea Scan PC* is completely controlled by the *Remote* computer. Prior to initiating a Host-Remote connection, the *Remote Sea Scan PC* system must be prepared for autonomous use. As outlined in the *Sea Scan PC Host-Remote Serial Communications Protocol Reference Manual*, the *Remote* must start up in a query state. The *Host* broadcasts the RCA sentence over the RS232 serial connection signaling that it is available for remote control.

6.6.2.2 Host Remote Settings

Select the Host-Remote|Settings menu item in the External menu to set the Host-Remote settings. The *Host-Remote Settings* dialog is displayed. The dialog consists of three sections: the Host-Remote Connection section; the RCA Sentence Interval section and the Communication Port section.

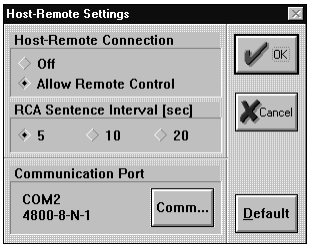

Figure 6-18 Host-Remote Settings Dialog

Host-Remote Connection

Enable the Host-Remote feature by selecting the *Allow Remote Control* radio button. A mark will appear in the radio button when the option is enabled.. When the Host-Remote feature is enabled, the *Sea Scan PC* will broadcast the RCA sentence over the RS232 serial connection signaling that it is available for remote control. Furthermore, if the *Sea Scan PC* is not already set to *respond automatically to dialog boxes*, this option is enabled automatically. This option is essential for use in the Host-Remote mode. See **Automatic Options - Respond Automatically to Dialog Prompts** 28 for more information about this option.

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RCA Sentence Interval

The RCA Sentence Interval section dictates the interval time in seconds between the broadcasts of successive RCA sentences. To select an interval, place the cursor on the corresponding radio button, then press and release the left mouse button. The selected radio button will now appear marked and the previously selected radio button will be cleared. Only one radio button may be selected at any time.

Communication Port

The Communication Port section displays the current serial port settings for the Host-Remote interface. If the Host-Remote feature is enabled, select the *Comm…* button to change the serial port settings. See **Setting Communications Port Settings** 141 for more information on changing the serial port settings for an external device.

6.6.2.3 Testing Serial Communication - Host Remote

Overview

You may test the serial communications of the Host-Remote interface by selecting the Host-Remote|Test Communications menu item from the External menu. This menu command displays a dialog that displays the serial port settings and checks the availability, composition and integrity of the serial transmissions. The dialog consists of a single *Input* section and the *Log...* and *OK* buttons. To remove the dialog, select the *OK* button or select the Host-Remote|Test Communications menu item from the External menu again to return to normal operation.

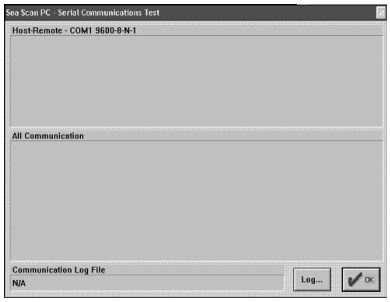

Figure 6-19 Serial Communications Test - Host-Remote Dialog

Device and Serial Port Settings

The serial port settings are displayed in the caption of the Input section..

Input

The Input section displays a continuous scrolling list of the input sentences that have been received from the *Remote* system and the output sentences that have been sent from the *Host*. Each input sentence received from the *Remote* is prefixed with *R>*. Each output sentence sent from the *Host* is prefixed with *H>*.

Log…

Select the *Log...* button to record the incoming and outgoing serial transmissions for debugging and analysis in a communications log file. You will be prompted by the *Select Communications Log File* dialog to set a filename, preferably with the *.clf* extension, and a destination directory for the communications log file. Upon selection of a valid filename and location, the *Sea Scan PC* will place some header information in the file and then all subsequent incoming transmissions from the external device. The raw information will be logged until you close the *Serial Communications Test* dialog and return to normal operations. This communications log file is very useful for debugging difficulties with external devices.

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6.7 Output

6.7.1 Overview

This chapter describes the output feature in the *Sea Scan PC* software. This feature allows you to send information about markers to an external device. When you select an item in the sonar image data, a proprietary sentence containing information about the selected contact is broadcast over the output serial connection.

6.7.2 PCON Output Sentence

The output contact sentence is modeled after the protocol outlined in the *NMEA 0183 Standard for Interfacing Marine Electronic Navigational Devices version 2.1*. The NMEA 0183 protocol allows marine instruments to transmit and receive information via a serial cable. In fact, the NMEA 0183 protocol allows for proprietary sentences. A proprietary sentence must contain a unique talker identifier that begins with a P followed by a three character identification code. The output contact sentence using PCON as the unique talker identifier.

The time stamp in the PCON sentence is dependent on the time zone environment variable that the host operating system provides for Sea Scan PC. If the time zone environment variable is not set, the time reported in the PCON sentence may be incorrect. For more information on setting the time zone environment variable please refer to **Setting the Time Zone** 181 in the Appendices.

The proprietary PCON sentence contains ten fields. The first six fields are identical in format to the ZDA sentence that is used for time and date. The time and date in these fields refers to the time and date of the sonar data line on which the contact marker is located. This set of fields informs the external device the time and date that the contact was scanned by the *Sea Scan PC*. The next four fields are identical in format to the first four fields of the WPL sentence that is used for waypoint location. This set of fields informs the external device of the latitude/longitude of the contact as calculated by the *Sea Scan PC*.

$PCON,hhmmss.ss,xx,xx,xxxx,xx,xx,llll.ll,a,llll.ll,a*hh<CR><LF>

where in order:

$	delimiter, start of sentence
PCON	proprietary TALKER identifier and sentence formatter
hhmmss.ss	UTC Time
xx,xx	UTC Day, 01 to 31; Month, 01 to 12
xxxx	UTC Year
xx	Local zone hours, 00 to ±13 hrs, local timezone is the magnitude of hours plus the magnitude of minutes added, with the sign of local zone hours, to local time to obtain GMT. Local zone is generally negative for east longitudes with local exceptions near the International Date Line.
xx	Local zone minutes, 00 to ±59
llll.ll,a	contact latitude, N/S
llll.ll,a	contact longitude, E/W
*	delimiter, end of data fields
hh	checksum, 8-bit exclusive OR (no start or stop bits) of all characters in the sentence, including "," delimiters, between but not including the "$" and the "*" delimiters. The hexadecimal value of the most significant and least significant 4 bits of the result is converted to two ASCII characters (0-9, A-F) for transmission.
<CR><LF>	carriage return, line feed (Hex 0D 0A), end of sentence

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6.7.3 Sea Scan PC Software

6.7.3.1 Overview

The contact information is broadcast to an external device after a contact in the sonar image has been identified with a marker.

6.7.3.2 Output Settings

Select the Output | Settings menu item in the External menu to set the output settings. The *Output Settings* dialog is displayed. The dialog consists of two sections: the Output Information section and the Communication Port section.

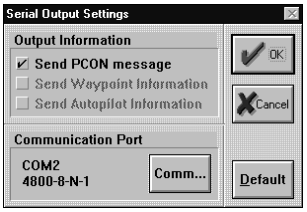

Figure 6-20 Output Settings

Output Information

The Output Information section allows you to select the various output options. To enable an output option, place the cursor on the corresponding check box, then press and release the left mouse button. A check mark will appear in the check box when the option is enabled. The *Send PCON message*, as described above, is the only option currently available.

Communication Port

The *Communication Port* section displays the current serial port settings for the Output device. If the *Send PCON message* option is enabled, select the *Comm…* button to change the serial port settings. See **Setting Communications Port Settings** 141 for more information on changing the serial port settings for an external device.

6.7.3.3 Testing Serial Communication - Output

Overview

You may test the serial communications of the output device by selecting the Output|Test Communications menu item from the External menu. This menu command displays a dialog that displays the serial port settings and checks the availability, composition and integrity of the serial transmissions. The dialog consists of a single *Input* section and the *Log...* and *OK* buttons. To remove the dialog, select the *OK* button or select the Output|Test Communications menu item from the External menu again to return to normal operation.

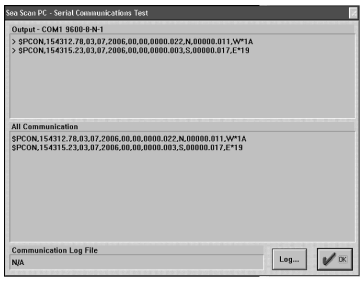

Figure 6-21 Serial Communications Test - Output Dialog

Serial Port Settings

The serial port settings are displayed in the caption of the Output section.

Output

The Output section displays a scrolling list of the output sentences that have been sent to the external output device.

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Log…

Select the *Log...* button to record the outgoing serial transmissions to the external device for debugging and analysis in a communications log file. You will be prompted by the *Select Communications Log File* dialog to set a filename, preferably with the *.clf* extension, and a destination directory for the communications log file. Upon selection of a valid filename and location, the *Sea Scan PC* will place some header information in the file and then all subsequent incoming transmissions from the external device. The raw information will be logged until you close the *Serial Communications Test* dialog and return to normal operations. This communications log file is very useful for debugging difficulties with external devices.

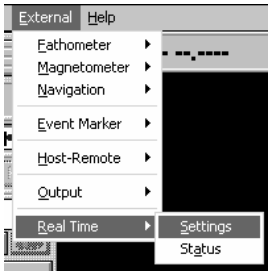
6.8 Real Time

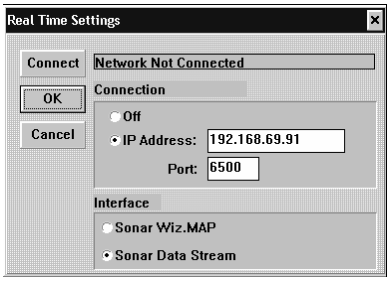
6.8.1 Overview

Sea Scan PC version 1.8.0 adds the ability to output the data that is collected in real time to another program using the host computers network connection. This ability is primarily used for connecting to Real Time Mosaicing applications such as Sonar Wiz.MAP from Chesapeake Technology. In order to use this feature you will be required to have some knowledge about your computers' network connections.

6.8.2 Settings

The real time interface sub menu can be found as one of the options in the external menu in Sea Scan PC. To configure the real time interface select the Settings menu option.





After clicking the Settings menu option, the Real Time Settings dialog window will appear. This window contains all of the configuration settings for the real time interface.

Click the OK or Cancel button when finished to close the Real Time Settings window.

The first step in setting up a real time interface is to configure the network Connection. There basically are two options when configuring the network Connection. These are Off and On. The Off option is labeled. The On option is not labeled however it is implied by the activation of the IP Address and Port entry boxes. When the Off option is selected the IP Address and Port entry boxes will be inaccessible and is indicated by them being grayed out. When the On option is selected you will be able to click in either of the entry boxes and type.

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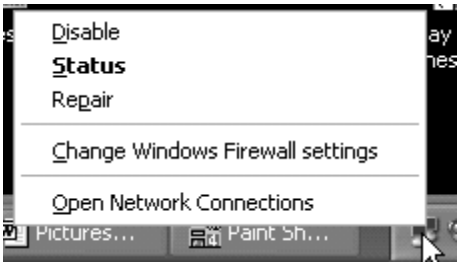
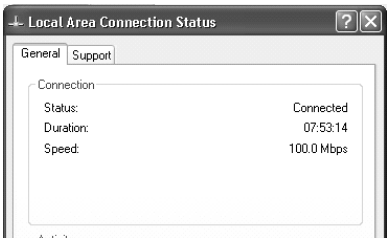
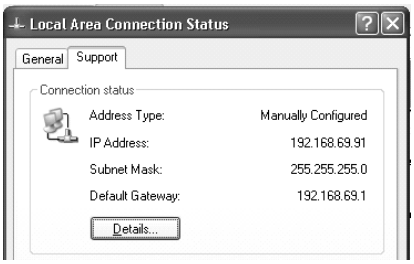
The IP Address is the address of the computer that will be receiving the collected data. This typically is 4 numbers between 1 and 255 separated by periods or dots. You can find the IP address of the receiving computer by right clicking on the network icon next to the clock on the computer that will be receiving the data as shown in the picture to the right. This procedure as shown is performed in Windows XP. The procedure for other operating systems will vary.





Then choose the Status option. This will show the Local Area Network Connection Status window. Next click on the Support tab.

This will display the Connection Status information. This will show the IP Address that the computer is currently configured to. This is the number you will type into the Sea Scan PC real time IP Address entry box. Click the Close button in the Local Area Network Connection Status window when finished.



The Port entry box needs to be filled out with the number of the port that the receiving application will be listening on. For Sonar Wiz.MAP the port number is typically 6500. For other applications please refer to their product documentation for the Port number.

The next step in setting up a real time connection is choosing the correct interface type. For Sonar Wiz.MAP please choose the Sonar Wiz.MAP option. For all other applications please choose the Sonar Data Stream option.

Finally start the application on the receiving computer and click the Connect button in the Real Time Settings window. The status of the connection will be displayed to the right of the Connect button. If the receiving application is running and the Connection settings were filled out correctly, the status should now read Connected.

You may now click the OK button to keep the changes you have made or click the Cancel button to throw away the changes you have made to the settings.

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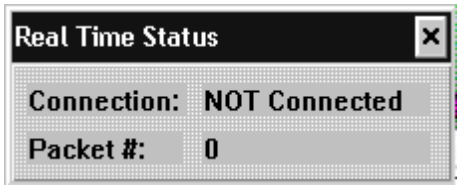
6.8.3 Status

The real time interface in addition to having a Settings window also has a Status window. This window displays the current status of the real time interface. It will display the connection status as well as the number of the current data package that is being sent over the real time connection. Notice in the example to the right that the status window indicates that the connection is NOT Connected. Other possible phrases include Connected and Reconnecting.



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Section 7

- **Appendices**

7 Appendices

7.1 Sea Scan PC Files

7.1.1 Introduction

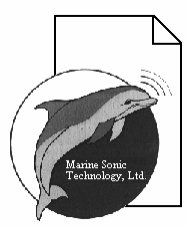
An Intel-based computer with the Windows operating system has a multitude of uses, only one of which is the *Sea Scan PC* display and control system. The operating system must allow multiple file formats for all the different applications that operate on the computer. Unlike Apple computers, Windows does not have a rigorous file recording system to control the different types of files. Thus, all one can do is use a specific extension (*.mst*) for a data file and hope it does not clash with another application's default data file extension name. MS-DOS reserves some extension types, such as: *.exe* for executables; and *.bat* for batch files. Likewise, Windows reserves some extensions, such as *.dll* for application extensions and *.386* for virtual device drivers. Many others are "reserved" by convention, such as: *.txt* for standard text files; *.doc* for Word for Windows documents; *.tif* for TIFFs; *.xls* for Excel spreadsheets; etc.. Marine Sonic Technology, Ltd. has adopted the file extensions: *.mst* for the *Sea Scan* PC data files; *.mkr* for the marker/waypoint text files; and *.svy* for the main survey log file among others.

NOTE: Marine Sonic Technology, Ltd. retains the rights on the *Sea Scan PC* file formats, and publishes the formats only for the express use of its *Sea Scan PC* clients.

7.1.2 Image Data File

7.1.2.1 Overview

By default the sonar image data file uses the *.mst* extension. The use of this specific extension facilitates the search of MSTL *Sea Scan PC* data files by the *Sea Scan PC Review* application.



Marine Sonic Technology, Ltd. has adopted a variation of the TIFF (Tagged Interchange File Format) to store the data generated by the *Sea Scan PC* application. Although the new Marine Sonic TIFF (MSTIFF) makes use of similar storage conventions as a standard TIFF, it should not be considered a TIFF.

MSTIFF has been designed to be a basic data format for the Marine Sonic Technology, Ltd. sonar data files. A high priority was given to structuring the data in such a way to minimize any difficulties for future additions. This format allows for additions and enhancements to the data file as the capabilities of the *Sea Scan PC* improve. MSTIFF was designed to be an extensible data format. The MSTIFF format is modeled after the TIFF (Tagged Interchange File Format) Specification Revision 5.0 ã Aldus Corporation 1990. Although TIFFs allow for customization of the format, MSTL decided it was better to use the basic structure and create our own MSTL specific tags instead of trying to fit all of our proprietary information into the TIFF.

Please refer to the accompanying document titled, *MSTIFF – MSTL Image Data File Format* for more information about the MSTIFF.

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7.1.3 Marker/Waypoint Data File

7.1.3.1 Overview

By default the marker/waypoint data file uses the *.mkr* extension. Although these are simple ASCII text files and would normally use the *.txt* file name extension, the use of this specific extension facilitates the search of *Sea Scan PC* marker/waypoint data files by the Sea Scan plotter.

7.1.3.2 Data File Format

This data file is a simple ASCII text storage of the Plotter markers and waypoints. The data file contains two distinct sections: the *Header* and the *Marker Information*.

7.1.3.2.1 Header

The header helps the *Sea Scan PC* identify the data file as a valid marker/waypoint data file. The exact string, *SeaScanPC-Waypoints*, must be present on the first line of the data file for the Sea Scan plotter to validate the text file. The version is then listed. The Year-2000 compliant date/time and computer system date/time are written, followed by the computer tick count system time. The marker information title fields are then written.

7.1.3.2.2 Marker Information Line

Each subsequent line in the data file contains a complete set of marker information. The marker information fields are separated by commas and each line is delimited at the end by the * character. Each set of marker information consists of:

Type This value may be either:
- 1 Waypoint marker (Green Cross)
- 2 Nadir marker (Purple Square)
- 4 Estimated marker (Red Square)
- 8 Magnetometer marker (Red square and black 'M')

Identifier This field contains the unique identifier for the marker. This identifier is assigned at the time the marker is created and may be changed by the reader.

Timestamp This field contains the timestamp for the sonar data line that is associated with the marker. If the marker does not have an associated sonar data line, this field is blank to indicate the system time as invalid.

Julian Date This field contains the Julian date for the sonar data line that is associated with the marker. If the marker does not have an associated sonar data line, this field is blank to indicate the date as invalid.

Julian Time This field contains the Julian time for the marker. This is the number of seconds since midnight of the sonar data line that is associated with the marker. If the marker does not have an associated sonar data line, this field is blank to indicate the time as invalid.

Target Latitude and Longitude These fields contain the latitude and longitude (L/L) of the target associated with the marker. The latitude and longitude are written in a standard format as degrees and decimal minutes followed by an ASCII character designating the hemisphere. There is not a comma between the degrees and decimal minutes. For the hemisphere: N, S, E and W represent north, south, east and west respectively.

Target Slant Range This field contains the slant range of the target associated with the marker in meters. This field is blank to indicate the slant range as invalid.

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Target Corrected Range This field contains the corrected range in meters from the nadir of the swath to the target. This field is blank to indicate the range as invalid.

Target Height This field contains the height of the target associated with the marker in meters. This field is blank to indicate the height as invalid.

Target Description This field contains the description string for the marker. The description string cannot be more than 32 characters.

Survey Latitude and Longitude These fields contain the latitude and longitude (L/L) of the survey vessel for the sonar data line associated with the marker. The latitude and longitude are written in a standard format as degrees and decimal minutes followed by an ASCII character designating the hemisphere. There is not a comma between the degrees and decimal minutes. For the hemisphere: N, S, E and W represent north, south, east and west respectively.

Towfish Altitude This field contains the altitude of the towfish for the sonar data line associated with the marker in meters. This field is blank to indicate the altitude as invalid.

Data filename This field contains the pathname (including the filename) of the file that contains the sonar data for the marker. This field is only valid if the *Sea Scan PC* was in automatic save mode. If the automatic save feature was disabled the text *AutoSaveOFF* will be written in the field. Furthermore, if the marker is a waypoint that was entered manually by the operator the text *ManualEntry* will be written in the field.

Water Depth This field contains the water depth for the sonar data line associated with the marker in meters. This field is blank to indicate the depth as invalid.

Layback Enabled This field indicates if a layback was enabled at the survey vessel position fix associated with the marker. *ON* indicates that the layback was enabled. *OFF* indicates that the layback was disabled, even if a layback offset appears in the next two fields.

Layback – X (Lateral) This field defines the lateral layback of the transducer from the null point of the survey vessel. A negative and positive value for the X distance sets the layback to the left and right respectively of the null point of the survey vessel. The layback is measured in meters.

Layback – Y (Axial) This field defines the axial layback of the transducer from the null point of the survey vessel. A negative and positive value for the Y distance sets the layback to the fore and aft respectively of the null point of the survey vessel. The layback is measured in meters.

Y2K Date This field contains the year 2000-compliant date for the sonar data line that is associated with the marker. If the marker does not have an associated sonar data line, this field is blank to indicate the date as invalid.

Layback Latitude and Longitude These fields contain the latitude and longitude (L/L) of the sonar for the sonar data line associated with the marker. The sonar is offset from the null point of the survey vessel by the layback. These fields are blank if the layback is not enabled. The latitude and longitude are written in a standard format as degrees and decimal minutes followed by an ASCII character designating the hemisphere. There is not a comma between the degrees and decimal minutes. For the hemisphere: N, S, E and W represent north, south, east and west respectively.

Target UTM These fields contain the UTM northings, eastings and zone of the target associated with the marker. There is a comma between the northings,

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eastings and zone entries.

Survey UTM These fields contain the UTM northings, eastings and zone of the survey vessel for the sonar data line associated with the marker. There is a comma between the northings, eastings and zone entries.

Layback UTM These fields contain the UTM northings, eastings and zone of the sonar for the sonar data line associated with the marker. There is a comma between the northings, eastings and zone entries.

7.1.3.3 Sample Marker File

The following is an example of a valid marker data file with a single marker. Note that the *Fields* line and the *Marker Information* line are actually single lines in the *.mkr* file; however, they have been divided into separate lines for display in this manual.

```
SeaScanPC-WaypointsVersion: 6
Y2KDate: 20000902
Y2KTime: 1454
Date: Saturday, September 02 2000
Time: 00:24:14 (EDT)
SysTime: 217368802

Fields: Type,ID,SysTime,JD,JT,TgtLL,(+/-)TgtSlantRng,(+/-)TgtCorrected,
Rng,TgtHght,TgtDesc,TowfishLL,TowfishAlt,DataFile,WaterDepth,LaybackOn,
LaybackX,LaybackY,Y2KD,LaybackLL,TargetUTM,TowfishUTM,LaybackUTM*
4,1,217379590,00245,1466,0000.024,S,00000.037,E,+80.47,,,Est00001,
0000.006,N,00000.006,E,,AutoSaveOFF,25.31,OFF,0.00,0.00,20000902,
,,,,9999955.73,166090.16,31M,11.07,166032.59,31N,,,*
```

7.1.4 Survey File

7.1.4.1 Overview

By default the survey file uses the *.svy* extension. Although these are simple ASCII text files and would normally use the *.txt* file name extension, the use of this specific extension facilitates the search of *Sea Scan PC* survey files. A survey file is created automatically each time the *Sea Scan PC* application is started if the survey file option is enabled. All of the subsequent external information and data storage activity is written to the survey file. As a result, you will be able to completely recreate the survey based on the stored information.

7.1.4.2 Survey File Format

The survey file, a simple ASCII text file, is a continuous log of all the incoming navigational information and also any data storage activity. The current operational settings and other external inputs are recorded with the navigational input. The survey file must differentiate between sections that contain navigational and other external information and sections that contain data storage information. ASCII line delimiters frame each of the separate sections. *STARTNAV* and *STOPNAV* frame the navigational information. *STARTDATA* and *STOPDATA* frame the data storage information. The ASCII line *EOF* marks the end of the survey file.

The survey file contains three distinct sections: the *Header*; the *Navigational and External Information*; and the *Data Storage Information*.

7.1.4.2.1 Header

The optional header helps the *Sea Scan PC* identify the data file as a valid survey file. The exact string, *SeaScanPC-SurveyFile*, must be present as the first line of the file. The version is then listed. The year-2000 compliant date/time and computer system date/time are written, followed by the computer tick count system time. The data mode, which indicates whether the *Sea Scan PC* was in

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training or active mode, is also written.

The header then displays the list of items that are recorded in the survey file. This list contains mandatory and optional items as selected by the user in the *Survey File Options* dialog.

7.1.4.2.2 Navigational and External Information

Each of the separate navigational information sections is framed by the ASCII line *STARTNAV* at the beginning and the ASCII line *STOPNAV* at the end. Each subsequent line in the survey file contains a complete set of navigational and external information. Commas or tabs, as selected by the operator in the *Survey File Options* dialog, separate the information fields. Each line is delimited at the end by the * character. Each line of information may consist of:

Timestamp

System Timestamp This required field contains the timestamp for the navigational information record. The timestamp is the number of milliseconds elapsed since Windows was started.

Julian Date/Time This field contains the Julian date and time for the navigational information record.

Y2K-compliant Date/Time This field contains the year-200 compliant date and time for the navigational information record.

Navigational Input

Position These required fields contain the latitude and longitude (L/L) of the survey vessel for the navigational information record. The latitude and longitude are written in a standard format as degrees and decimal minutes followed by an ASCII character designating the hemisphere. There is not a comma between the degrees and decimal minutes. For the hemisphere: N, S, E and W represent north, south, east and west respectively.

Course-Over-Ground This field contains the true course-over-ground for the navigational information record.

Speed-Over-Ground This field contains the speed-over-ground in knots for the navigational information record.

Time Delays These fields contain the primary and secondary time delay used in the Loran C latitude/longitude calculation for the navigational information record. A blank indicates an invalid value.

Side Scan Parameters

Channel This required field indicates the channel mode in use at the time of the navigational record. The channel field is *LEFT*, *RIGHT* or *BOTH*.

Range This required field indicates the transducer range in meters at the time of the navigational record.

Frequency This required field indicates the transducer frequency in kHz at the time of the navigational record. The frequency may be listed as *Unknown*.

Range Delay This field indicates the range delay in meters in use at the time of the navigational record.

Power This field indicates the power state of the transducers at the time of the navigational record. The power may be *ON* or *OFF*.

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Towfish Altitude This field indicates the altitude of the towfish in meters at the time of the navigational record. A blank indicates an invalid value.

Fathometer Parameters

Water Depth This field indicates the latest water depth in meters at the time of the navigational record. A blank indicates an invalid value

Magnetometer Parameters

Reading This field indicates the latest magnetic field reading in gammas from the magnetometer at the time of the navigational record. A blank indicates an invalid value.

Min/Max Interval Reading These fields indicate the minimum and maximum readings in the interval since the last navigational record. The minimum and maximum readings indicate the level of activity in the time between navigational records. A blank indicates an invalid value

7.1.4.2.3 Data Storage Information

Each of the data storage sections is framed by the ASCII line *STARTDATA* at the beginning and the ASCII line *STOPDATA* at the end. Each data storage section consists of four lines with the following information:

Data Pathname This line identifies the pathname of the data file and the filename.

Version This line designates the data file version. The line consists of the word *Version:* followed by a space and then the version number.

Begin/End System Time The begin and end system time lines store the timestamp for the first (begin system time) and last (end system time) line of the data stored in the data file. The timestamp is the system time, the number of milliseconds elapsed since Windows was started.

7.1.4.2.4 Sample Survey File

The following is an example of a valid survey log file. Note that the *Navigation and External Information* lines are actually single lines in the *.svy* file; however, they have been divided into separate lines for display in this manual.

```
SeaScanPC-Survey
FileVersion: 9Y2K
Date: 20000902Y2KTime: 1484
Date: Saturday, September 02 1998
Time: 00:24:44 (EDT)SysTime: 10170783
DataMode: TRAININGTimeStamp: SysTime Julian Y2K
Navigation:  Position COG SOG
SideScanParms:  Channel Range Frequency RangeDelay Power
FathometerParms:  WaterDepth
MagnetometerParms:  Reading MinMaxReading

Operations:  DataStorage

FileFormat: Comma-delimited

STARTNAV
10171484,98245,1486,19980902,1486,0,00.001,N,0,00.001,E,45.0,3.2,Both,
100,600,0.00,ON,25.94,,,*10172583,98245,1488,19980902,1488,0,00.003,N,0,00.003,E,45.0,3.2,
```

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```
Both,
100,600,0.00,ON,24.81,,,*10173682,98245,1491,19980902,1491,0,00.004,N,0,00.004,E,45.0,3.2,
Both,
100,600,0.00,ON,24.93,,,*
10174780,98245,1493,19980902,1493,0,00.005,N,0,00.005,E,45.0,3.2,Both,
100,600,0.00,ON,25.06,,,*10175826,98245,1495,19980902,1495,0,00.006,N,0,00.006,E,45.0,3.2,
Both,
100,600,0.00,ON,25.18,,,*
.
.
.
10437522,98245,1521,19980902,1521,0,00.031,N,0,00.031,E,45.0,3.2,Both,
100,600,0.00,ON,23.34,,,*
STOPNAV
STARTDATA
DataPathname: C:\SSPCDATA\02SEP\02SEP000.mst
Version: 1
BeginSysTime: 10196848
EndSysTime: 10438157
STOPDATA

STARTNAV10438634,98245,1523,19980902,1523,0,00.032,N,0,00.032,E,45.0,3.2,Both,
100,600,0.00,ON,23.25,,,*.
.
.
STOPNAVEOF
```

7.1.5 Fathometer Survey File

7.1.5.1 Overview

By default the fathometer survey file uses the *.dpt* extension. Although these are simple ASCII text files and would normally use the *.txt* file name extension, the use of this specific extension facilitates the search of *Sea Scan PC* fathometer survey files. A fathometer survey file is created automatically each time the Sea Scan PC application is started if the fathometer survey file feature is enabled. All of the subsequent depth information from the fathometer is written to the file. As a result, you will be able to completely recreate the water depth based on the stored information.

7.1.5.2 Fathometer Survey File Format

The fathometer survey file, a simple ASCII text file, is a continuous log of all the incoming fathometer information. The fathometer depth file contains two distinct sections: the *Header*; and the *Fathometer Depth Information.*

7.1.5.2.1 Header

The optional header helps the *Sea Scan PC* identify the data file as a valid fathometer survey file. The exact string, *SeaScanPC-FathometerFile*, must be present as the first line of the file. The version is then listed. The year-2000 compliant date/time and computer system date/time are written, followed by the computer tick count system time. The data mode, which indicates whether the *Sea Scan PC* was in training or active mode, is also written.

The header then displays the list of timestamps that are recorded in the survey file. The timestamps options set in the *Survey File Options* dialog are used for all the survey files, including the fathometer survey file.

7.1.5.2.2 Fathometer Depth Information

Each subsequent line in the fathometer survey file contains a complete set of timestamp, position, and fathometer information. Commas or tabs, as selected by the operator in the *Survey File Options* dialog, separate the information fields. Each line is delimited at the end by the * character. Each line of information may consist of:

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System Timestamp This required field contains the timestamp for the navigational information record. The timestamp is the number of milliseconds elapsed since Windows was started.

Julian Date/Time This field contains the Julian date and time for the navigational information record.

Y2K-compliant Date/Time This field contains the year-200 compliant date and time for the fathometer record.

Position These required fields contain the latitude and longitude (L/L) of the survey vessel for the fathometer record. The latitude and longitude are written in a standard format as degrees and decimal minutes followed by an ASCII character designating the hemisphere. There is not a separator between the degrees and decimal minutes. For the hemisphere: N, S, E and W represent north, south, east and west respectively.

Water Depth This field indicates the water depth in meters. A blank indicates an invalid value

Towfish Altitude This optional field contains the altitude of the transducers in meters. The field is blank if the towfish altitude is invalid or not available.

7.1.5.3 Sample Fathometer Survey File

The following is an example of a valid fathometer survey file. In this case, the towfish altitude is not available and the optional field is left blank.

```
SeaScanPC-FathometerFile
Version: 4
Y2KDate: 20001201
Y2KTime: 43205
Date: Friday, December 01 2000
Time: 12:00:05 (EST)
SysTime: 311096
DataMode: TRAINING

TimeStamp: SysTime Julian Y2K

FileFormat: Comma-delimited

313149,00335,43207,20001201,43207,0000.001,N,00000.001,E,24.81,*
315178,00335,43210,20001201,43210,0000.003,N,00000.003,E,24.93,*
317219,00335,43212,20001201,43212,0000.004,N,00000.004,E,25.06,*
319254,00335,43214,20001201,43214,0000.005,N,00000.005,E,25.18,*
```

7.1.6 Magnetometer Survey File

7.1.6.1 Overview

By default the magnetometer survey file uses the *.mag* extension. Although these are simple ASCII text files and would normally use the *.txt* file name extension, the use of this specific extension facilitates the search of *Sea Scan PC* magnetometer survey files. A magnetometer survey file is created automatically each time the *Sea Scan PC* application is started if the magnetometer survey file feature is enabled. All of the subsequent readings from the magnetometer are written to the file. As a result, you will be able to completely recreate the magnetometer survey based on the stored information.

7.1.6.2 Magnetometer Survey File Format

The magnetometer survey file, a simple ASCII text file, is a continuous log of all the incoming magnetometer readings. The magnetometer survey file contains two distinct sections: the *Header*;

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and the *Magnetometer Readings Information.*

7.1.6.2.1 Header

The optional header helps the *Sea Scan PC* identify the data file as a valid magnetometer survey file. The exact string, *SeaScanPC-MagnetometerFile*, must be present as the first line of the file. The version is then listed. The year-2000 compliant date/time and computer system date/time are written, followed by the computer tick count system time. The data mode, which indicates whether the *Sea Scan PC* was in training or active mode, is also written.

The header then displays the list of timestamps that are recorded in the survey file. The timestamps options set in the *Survey File Options* dialog are used for all the survey files, including the magnetometer survey file.

7.1.6.2.2 Magnetometer Readings Information

Each subsequent line in the magnetometer survey file contains a complete set of timestamp, position, and magnetometer reading. Commas or tabs, as selected by the operator in the *Survey File Options* dialog, separate the information fields. Each line is delimited at the end by the * character. Each line of information may consist of:

System Timestamp This required field contains the timestamp for the navigational information record. The timestamp is the number of milliseconds elapsed since Windows was started.

Julian Date/Time This field contains the Julian date and time for the navigational information record.

Y2K-compliant Date/Time This field contains the year-200 compliant date and time for the magnetometer record.

Position These required fields contain the latitude and longitude (L/L) of the survey vessel for the magnetometer record. The latitude and longitude are written in a standard format as degrees and decimal minutes followed by an ASCII character designating the hemisphere. There is no comma between the degrees and decimal minutes. For the hemisphere: N, S, E and W represent north, south, east and west respectively.

Reading This field indicates the magnetic field reading in gammas from the magnetometer. A blank indicates an invalid value.

7.1.6.3 Sample Magnetometer Survey File

The following is an example of a valid magnetometer survey file.

```
SeaScanPC-MagnetometerFile
Version: 3
Y2KDate: 20001201
Y2KTime: 43205
Date: Friday, December 01 2000
Time: 12:00:05 (EST)
SysTime: 311097
DataMode: TRAINING

TimeStamp: SysTime Julian Y2K

FileFormat: Comma-delimited

372558,00335,43267,20001201,43267,0000.038,N,00000.038,E,45448.00*
372601,00335,43268,20001201,43268,0000.038,N,00000.038,E,45447.00*
372711,00335,43268,20001201,43268,0000.038,N,00000.038,E,45446.00*
372821,00335,43268,20001201,43268,0000.038,N,00000.038,E,45445.00*
372931,00335,43268,20001201,43268,0000.038,N,00000.038,E,45444.00*
```

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7.1.7 Auto GIF Information Log File

7.1.7.1 Overview

The AutoGIF operation allows the operator to quickly generate a set of GIF files from a set of *Sea Scan PC* data files. This ability allows the operator to quickly compile an image archive of features from a survey. The AutoGIF operation also allows the operator to georeference the feature in the GIF image and adds comments. The georeference information and comments are compiled in the AutoGIF information log file.

7.1.7.2 Auto GIF Information Log File Format

The AutoGIF information log file contains a header, which contains the version information, that helps identify the text file as a valid AutoGIF information log file. Each subsequent line in the AutoGIF information log file contains the name of a GIF file and the corresponding information. Each line of information consists of:

GIF Pathname	This line identifies the pathname of the GIF file and the filename.
MSTIFF filename	This field identifies the filename of the *Sea Scan PC* data file from which the GIF was generated.
Feature Date/Time	These fields contain the date and time that the sonar image of the selected feature were collected. The white arrows along the left, right and bottom edges of the GIF image indicate the selected feature.
Feature Position	These fields contain the latitude and longitude of the selected feature. The white arrows along the left, right and bottom edges of the GIF image indicate the selected feature.

7.1.7.3 Sample Auto GIF Information Log File

The following is an example of a valid AutoGIF information log file. Note that the lines are actually single lines in the *gifinfo.txt* file; however, they have been divided into separate lines for display in this manual.

```
#Version: 1.1
D:\SSPCDATA\img00001.gif,SAMPLE.MST,20000917,12:23:28,00 00.012N
00 00.016W,This is a sample image
```

7.2 Running Sea Scan PC and Sea Scan Review in Windows XP

Both Sea Scan PC and Sea Scan Review are capable of running in the Windows XP operating system environment. Due to the advanced capabilities of this operation system, there are some common difficulties that may occur when running Sea Scan PC or Sea Scan Review on them. This section addresses the most common issues and provides explanations as well as a solution for solving the issue to allow for proper operation of Sea Scan PC and Sea Scan Review on Windows XP.

7.2.1 Windows 16 bit Emulation

Sea Scan PC and Sea Scan Review are known as Win16 applications. These applications were originally written for use on Window 3.1 and variants. Windows 3.1 is a 16 bit version of Windows, hence the abbreviated name Win16. When Microsoft created Windows 95, it created a new operating system architecture known as Win32 because it is a 32 bit version of Windows. The Win32 platform extends all the way to Windows XP and Windows 2000.

Win16 programs are not directly compatible with Win32 operating systems. In order for customers to

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use their existing Win16 programs on Windows 95, Microsoft created a Win16 emulator. This program provides the Win16 programs with the necessary environment to run in a Win32 operating system. The Win16 emulator consists of two programs, NTVDM.EXE and WOWEXEC.EXE. These two programs are used together to form the Win16 emulator.

7.2.1.1 Windows 16 Bit Emulation Problems

As time goes by, decisions are made to phase out Win16 compatibility. This has been slowly happening with the introduction of new operating systems. Marine Sonic Technology has been able to correct the Sea Scan PC and Sea Scan Review applications for all of Microsoft's Operating systems.

Occasionally other software companies create software that interferes with the correct operation of the Win16 emulation in Windows XP. Below is a list of software titles that have been know to cause problems. If you are having trouble getting your Sea Scan PC or Sea Scan Review installation to operate properly and you have one or more of these programs installed, please uninstall the offending application(s).

Software With Known Compatibility Issues

- *Embassy Trust Suite by Wave Systems*

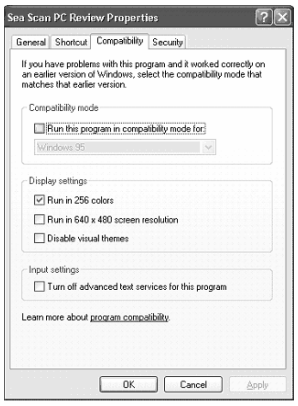
7.2.2 256 Colors

In order to run Sea Scan PC or Sea Scan Review, the operating system has to have its display set to 256 color mode. Unlike the Windows 95, 98, and Me versions of the Windows operating system, Windows XP has hidden the 256 color mode option in the Display Properties. 256 color mode has not been removed from the system, however there are two different methods to set it.

7.2.2.1 Compatibility Settings

1) To ensure that the display mode is set to 256 colors when Sea Scan PC or Sea Scan Review is run, right click on the Sea Scan PC or Sea Scan Review icon. Click on the Properties menu. This will display the the application's properties window.

2) Click on the Compatibility tab. This will display the Windows XP compatibility settings. Click the Run in 256 Colors check box in the Display Settings section.


Sea Scan PC Review Properties
General
Shortcut
Compatibility
Security
If you have problems with this program and it worked correctly on an earlier version of Windows, select the compatibility mode that matches that earlier version.
Compatibility mode
Run this program in compatibility mode for:
Windows 95
Display settings
Run in 256 colors
Run in 640 x 480 screen resolution
Disable visual themes
Input settings
Turn off advanced text services for this program
Learn more about program compatibility
OK
Cancel
Apply

3) Click the OK button. From this point forward, whenever the application is run, the computer will switch to 256 color mode.

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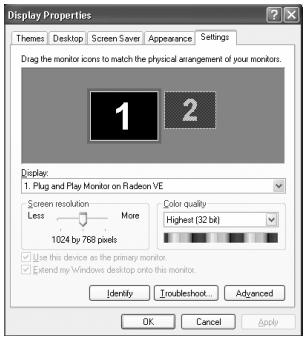
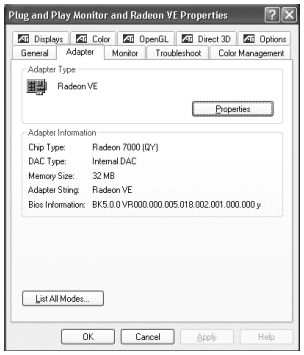
Sometimes this method does not work properly. If your user account on the Windows XP computer does not have administrator rights then there is a chance that this will not work. In case this method fails, please try using the advanced display properties to adjust the color depth.

7.2.2.2 Advanced Display Properties

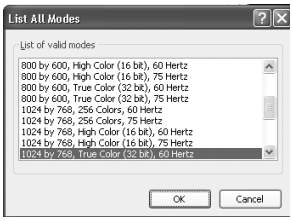
1) Another method for setting the computer to 256 color mode is by using the advanced display properties. Right click on the desktop. Make sure that there is not an icon beneath the cursor. This will show a menu. Choose the properties menu selection. The Display Properties window will now be visible.
2) Click on the Settings tab.
3) Click on the button labeled advanced. Doing so will open the Advanced Display Properties window.



4) Next, click the Adapter tab.
5) Then click on the List All Modes button. This will display a list of all the display modes that your video card can be set to.



6) Choose the video mode that is most similar to the current one you are using with a 256 color.
7) Click the OK button on the Mode List window.
8) Click the OK button on the Advanced Display Properties window. As soon as you click OK, Windows will switch your display mode. A dialog window will now pop up and ask you if you would like to keep the settings. Click the Yes button.
9) Click the OK button in the Display Properties window. Windows is now in 256 color mode.


List All Modes
List of valid modes
800 by 600, High Color (16 bit), 60 Hertz
800 by 600, High Color (16 bit), 75 Hertz
800 by 600, True Color (32 bit), 60 Hertz
800 by 600, True Color (32 bit), 75 Hertz
1024 by 768, 256 Colors, 60 Hertz
1024 by 768, 256 Colors, 75 Hertz
1024 by 768, High Color (16 bit), 60 Hertz
1024 by 768, High Color (16 bit), 75 Hertz
1024 by 768, True Color (32 bit), 60 Hertz
OK
Cancel

7.2.2.3 Other Programs Look Weird

While Windows is running in 256 color mode all of the applications that are currently running have to share the 256 colors. This may cause other applications such as web browsers and applications that were meant to use more than 256 colors to look weird. This is a visual affect only and does not adversely affect the operation of the application.

7.2.3 Short Files Names

Win16 programs are restricted to using file names of 8 main characters and a 3 letter file extension. Characters such as spaces cannot be used in a Win16 filename. Win32 programs has around 255 characters available for their file names and can use special characters such as spaces in the name. Besides file names, directory names also fall under this restriction.

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7.2.4 Limited Directory Depth

Win16 programs also have a limited directory depth. This depth is about 10 levels. Please do not place any data any more than directories deep. Marine Sonic Technology, Ltd. recommends that a data directory is placed in the root directory and named with a name of no more than 8 characters. We usually use SSPCDATA for the directory name.

7.2.5 Data Collection

Sea Scan PC communicates with the ISA/PC104 Sonar Hardware using a user mode driver. This driver works under Window 3.1, 98, 98Se, and Me. When creating Windows XP, Microsoft created the Hardware Abstraction Layer (HAL). This prevents any applications from using a user mode driver. This prevents Sea Scan PC from talking to the ISA/PC104 Sonar Hardware in Windows XP.

In order to be able to collect data with Sea Scan PC in Windows XP, a device driver has to be installed. As of version 1.8 of Sea Scan PC, a device driver is available for use with Windows XP. Please contact Marine Sonic Technology for more information.

7.3 Quick Button Reference

Here is a list of buttons and their associated functions. It can be used to quickly look up what a button does.

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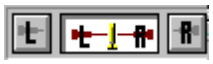
7.3.1 Sea Scan PC Task Bar

Power Button - Turns Power On/ Off to towfish.

Decrease Range Button

Increase Range Button

L Button for the left transducer only.

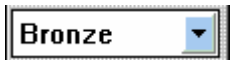


L/R Button for both transducers. **R Button** for the right transducer only.

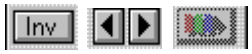
LF Button selects the low frequency in a dual frequency system. *Either LF or HF can be used with a single frequency towfish.*

HF Button selects the high frequency in a dual frequency system. *Either LF or HF can be used with a single frequency towfish.*

Color Scale Box selects the color scale.

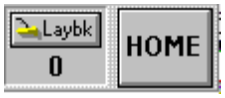


Inv Button inverts the color scale.



Custom Color Scale Button allows the creation of a custom color scale when active.

Laybk Button displays the layback dialog.



HOME Button returns the screen to the top of the image to view newest sonar data.

Manual SOG Button selects Auto/Manual Speed Over Ground.

NOTE - **Increase/Decrease Spd** buttons are active when **Manual SOG** is depressed.

Manually saves image on screen when selected.

AutoSAVE mode selected indicator.

Plotter Button displays the plotter.

Zoom Button activates the zoom in tool.

Gain Button activates and displays the gain dialog.

Delay Button activates the range delay tool.

Len. Button activates the length tool.

Hght Button activates the height tool.

Auto Button activates the auto gain mode.

Inc Button increases the gain. **Dec Button** decreases the gain.

Toggles On/Off annotation symbol(s) on the image.

Edits an annotation on the image. Adds an annotation to the image.

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7.3.2 Plotter

Configure (Plotters) Manually To Any Location		**Configure (Plotters) Automatically At Present Location**	
Zoom In		**Zoom Out**	
Pan (Centers At Point In View)		**Cycle Back (To Previous Views)**	
Show Swath (Sonar Coverage)		**Show Survey Track**	
Show Depth (Fathometer)		**Set Depth Colors (Fathometer)**	
Draw Shoreline (Coastal)		**Grid On/Off**	
Navigate To A Waypoint		**Navigate Between 2 Waypoints**	
Clear The Plotter		**Rename Markers or Waypoints**	
Add a Waypoint (W/ Mouse)		**Manually Enter a Waypoint (Lat/ Long)**	
Delete A Waypoint (W/ Mouse)		**Delete a marker (W/ Mouse)**	
Read and Place Previous Markers/ Waypoints in Potter		**Save a Marker/Waypoint File**	
Measure Distance		**Measure an Area (On Plotter)**	
Show Current Plotter		**Show Survey Plotter**	
Import (Previous) Survey Plotter		**Engage Survey Plotter**	

7.4 Setting the Time Zone

It may be necessary to inform Sea Scan PC of the correct time zone in which the data collection computer resides. The time zone affects the setting of the computer's clock using the **ZDA** 153 sentence and the time stamp sent out with **PCON messages** 161. In order for Sea Scan PC to read the correct time zone, the time zone environment variable needs to be set. The following sections will walk you through setting the time zone environment variable on Windows 98(Se), Windows Me, and Windows XP.

7.4.1 Windows 98

In order to set the time zone environment variable in Windows 98:

1) Go to the Start Menu and click on run.

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2) Enter msconfig.exe in the Open edit box.

3) Click the OK button.

4) This will bring up the System Configuration Utility.

5) Click on the autoexec.bat tab.

6) Click the New button.

7) Type:

   set TZ=zzz[+/-]d[d][lll]

   where "*zzz*" is a required three character string with the name of the current time zone, "*[+/-]d[d]*" is a required field with an optionally signed number of one or two digits specifying the local time zone's difference from GMT in hours, and "*lll*" is an optional three character field with the name of the local time zone during daylight saving time. For example, the following command sets the time zone to Pacific Time:

   set TZ=PST8PDT

   or for Greenwich Mean Time:

   set TZ=GMT0

8) Click OK

9) You may have to reboot the computer for the variable to take effect.

7.4.2 Windows Me

The procedure is similar to Windows 98. However there is no autoexec.bat file in Windows Me. In order to set the time zone environment variable in Windows Me:

1) Go to the Start Menu and click on Run.

2) Enter msconfig.exe in the Open edit box.

3) Click the OK button.

4) This will bring up the System Configuration Utility.

5) Click on the Environment tab.

6) Click the New button.

7) Type in the Variable Name: TZ

8) Type in the Varaible Value: *zzz[+/-]d[d][lll]*

   where "*zzz*" is a required three character string with the name of the current time zone, "*[+/-]d[d]*" is a required field with an optionally signed number of one or two digits specifying the local time zone's difference from GMT in hours, and "*lll*" is an optional three character field with the name of the local time zone during daylight savings time. For example, the following command sets the time zone to Pacific Time:

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Variable Name: TZ
Variable Value: PST8PDT

or for Greenwich Mean Time:

Variable Name: TZ
Variable Value: GMT0

9) Click OK.

10)Click the other OK button.

11) You may have to restart the computer for the time zone variable to take affect.

7.4.3 Windows XP

1) Right click on the My Computer icon. This will bring up a pop up menu.

2) Click on the properties menu item. This will bring up the System Properties window.

3) Click on the Advanced tab. Then click on the Environment Variables button. This will open the Environment variables window.

4) Click on the New under System Variables section in the Environment Variables window.

5) Type in the Variable Name: *TZ*

6) Type in the Varaible Value: *zzz[+/-]d[d][lll]*

where "*zzz*" is a required three character string with the name of the current time zone, "*[+/-]d[d]*" is a required field with an optionally signed number of one or two digits specifying the local time zone's difference from GMT in hours, and "*lll*" is an optional three character field with the name of the local time zone during daylight savings time. For example, the following command sets the time zone to Pacific Time:

Variable Name: TZ
Variable Value: PST8PDT

or for Greenwich Mean Time:

Variable Name: TZ
Variable Value: GMT0

7) Click OK.

8) Click the other OK button.

9) You may have to restart the computer for the time zone variable to take affect.

7.5 Test Procedures

This section contains test procedures for Sea Scan PC side scan sonar equipment.

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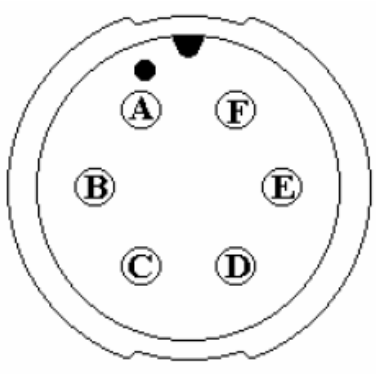
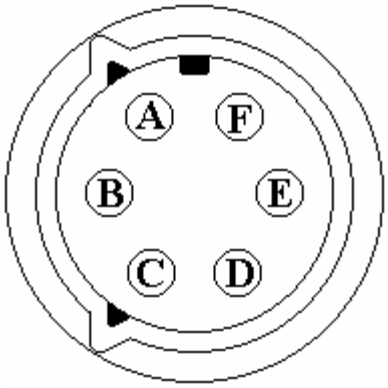
7.5.1 Tow Cable

7.5.1.1 Cable Pinouts

Dry End



Wet End



RED	**A**	Left channel data and power to towfish (+28 VDC)
	B	Left channel return
BLACK	**C**	Right channel data
	D	Right channel return
WHITE	**E**	High/Low frequency control power (+5 VDC)
	F	Control power return

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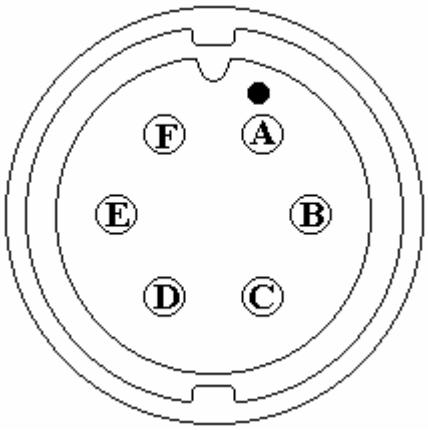
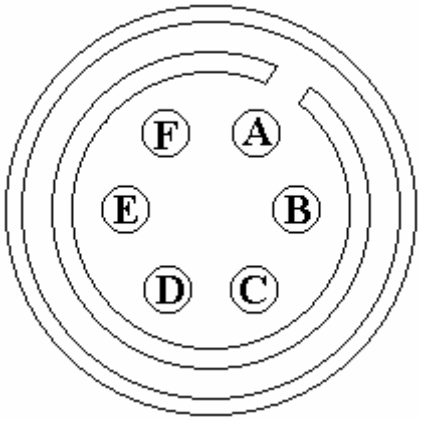
7.5.1.2 Pigtail Pinouts

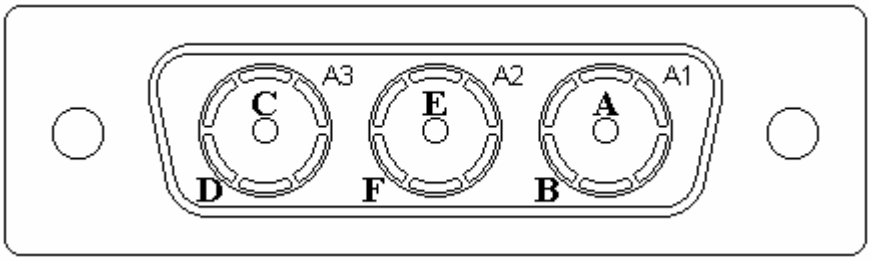
Pigtail (Cable Side)



Splashproof Pigtail (Computer Side)



Standard Pigtail (Computer Side)



RED	**A**	Left channel data and power to towfish (+28 VDC)
	B	Left channel return
BLACK	**C**	Right channel data
	D	Right channel return
WHITE	**E**	High/Low frequency control power (+5 VDC)
	F	Control power return

7.5.1.3 Using the Portable Test Unit

Each Sea Scan PC system sold includes a Portable Test Unit for testing the tow cable, pigtail, and sonar system card power output. Below are instructions on how to use this unit for troubleshooting purposes.

Test 1 Tow Cable Verification

1) Connect Test Unit to tow cable dry end.

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Note: Tow cable must not be connected to a towfish!

2) Press Test Button and note LEDs on test unit.

If any Red LED is energized, one of the Coaxial elements in the tow cable is shorted.

Note: The left channel (which also provides electrical power) must be OK for any operation of the towfish. If the right channel is shorted, operations can continue on the left channel only. For single frequency towfish only the first two coaxial elements (Right and Left channels) are required. The third coaxial element (E and F) is only required with dual frequency towfish.

Test 2 Confirm 28 VDC Output from Sonar

1) Connect Test unit to end of sonar interconnecting cable ("pigtail"). The tow cable may or may not be connected to the test unit.

2) Turn on the Computer and start the Sea Scan PC program.

3) Select **Power On** in the Sea Scan PC program.

If the Green LED is energized on the Test Unit the sonar system is providing the correct power to the tow cable.

If the Green LED is not energized, test the sonar output fuse. Replace the fuse if blown and repeat the above test.

Test 3 Fuse Tests

1) Remove suspect fuse and hold between brass contacts on side of tester. Use the outside buttons for long fuses and the inside buttons for shorter fuses. The metal ends of the fuse must be in contact with both buttons.

2) Press the test button.

If the fuse is good, the Green LED will be energized. If the fuse is blown, the Green LED will not be energized.

7.5.1.4 Testing Directions

End to End Testing

Test each individual cable conductor from one end of the cable to the other to check for broken conductors.

- The cable should have a resistance of around 8.2 Ohms per 100 meters (2.5 Ohms per 100 feet) for the data channels, and 2.1 Ohms per 100 meters (0.64 Ohms per 100 feet) for the return channels.
- Earlier generation cables may have a slightly different resistance, due to different cable type, but the data channels will still have higher resistance per meter than the return channels.
- Pigtails will have a very low resistance due to their short length.
- A break will have infinite resistance from end to end, or possibly a very high resistance.

Conductor to Conductor Testing

- This test can be done from either end if the cable passes the end to end test. Test each conductor to each of the other conductors to check for cable shorts or leakage.

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- A perfect cable will have infinite resistance between conductors, meaning each conductor is completely separate from all others.
- A very low resistance between one conductor and any other conductor indicates a short.
- The resistance of a short should be similar to the end to end check. A higher resistance between conductors (but not infinite resistance), may indicate saltwater intrusion or other cable damage.
- A short is most likely to occur between a data channel and it's return channel.

If the cable tested fine be sure to test the Pig Tail too!

7.5.1.5 Troubleshooting Chart

Cable Symptom	Possible Cable Problem
Towfish is connected but not transmitting.	Left cable channel broken or shorted, or cable has salt water intrusion.
Towfish fuse fails.	Left cable channel shorted or cable has salt water intrusion.
No right channel data.	Right cable channel open or shorted.
Heavy right channel noise.	Leakage between right channel conductors.
No response when switching to high frequency (dual frequency only).	Control channel open or shorted.

7.6 Sea Scan PC System Board Configuration

This section is primarily for Sea Scan PC users that have Sea Scan PC installed in an user less situation, i.e. AUV. If you have a towed system i.e. (have a towfish) then this section is not for you.

Marine Sonic Technology through the years has come out with several versions of the ISA/PC104 sonar system card. Sea Scan PC up until version 1.7.0 required that a separate version of Sea Scan PC be installed for some of these versions, specifically the High Speed and High Resolution Gain version(s). As of Sea Scan PC version 1.7.0, this requirement has been eliminated.

Sea Scan PC version 1.7.0 and above have the ability to automatically configure itself to use our newer PC104 boards. Our older PC104 boards that used the High Speed and High Resolution Gain need to be configured manually using the SSPC.INI file. All of the entries needed to configure the special PC104 board modes have to be placed in the **Operating Mode** section of this file. Failure to place the entries there will result in improper operation of the PC104 sonar system card and will very likely cause the sonar data to be collected in a sub-optimal manner.

For more information on sonar system card types and how to tell them apart please refer to the Sea Scan PC System Board Configuration Troubleshooting section. 188

7.6.1 High Speed Gain

The **High Speed Gain** entry is a *Boolean* (**TRUE** or **FALSE**) value. Entering ***TRUE*** will cause all of the gain slider ranges to be brought in by a factor of 4. Entering ***FALSE*** will turn off the high speed

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gain ranges. This feature will only work correctly when used with the appropriate hardware.

7.6.2 High Resolution Gain

The **High Resolution Gain** entry is a *Boolean* (**TRUE** or **FALSE**) value. Entering ***TRUE*** will turn on the high resolution gain sliders. Entering ***FALSE*** will use the normal gain slope model to calculate gain slider values. Please use this with systems that are equipped with the necessary hardware.

7.6.3 High Speed Ping Limit

The **High Speed Ping Limit** entry is a *Boolean* (**TRUE** or **FALSE**) value. A value of ***TRUE*** turns on the high speed ping limit only when the transducer frequency is 600 kHz or above. A value of ***FALSE*** turns off the high speed ping limit. The maximum low speed ping rate is 30 Hz and the maximum high speed ping rate is 70 Hz. Please use this with systems that are equipped with the necessary hardware.

7.6.4 Troubleshooting

In order to facilitate trouble shooting the ISA/PC104 sonar system card, a sonar system card mode display was added to Sea Scan PC. In order to enable this display, add the Display Board Mode entry into the SSPC.INI file under the **Operating Mode** section.

The **Display Board Mode** entry is a *Boolean* (**TRUE** or **FALSE**) value. This feature should be used only to test the SSPC104 board ID and software compatibility with the hardware being used. Entering ***TRUE*** will enable this feature. Enabling this feature will cause the board ID and status of the hardware features to appear in the Sea Scan PC application's caption bar.

When the Display Board Mode feature is activated, Sea Scan PC will display information about the PC104 board in the caption bar. An example is pictured below.

In the above example you can see that Sea Scan PC displays the status of the High Speed Ping Limit, the High Speed Gain, and the High Resolution Gain features. It also displays the ID of the ISA/PC104 sonar system card. This ID is retrieved from the sonar system card itself. It helps identify the features that the sonar system card has. Below is a table with Board ID's and their associated features.

Board ID	Features
0	Original ISA sonar system card.
1	Dual Frequency ISA sonar system card.
2	Dual Frequency PC104 sonar system card. ***** Please note that this board may have High Speed Ping Limit, High Speed Gain, and/or High Resolution Gain. For these sonar system cards, manual configuration will be required for proper operation. See below paragraphs for more information.**
8	Dual Frequency + High Resolution Gain + High Speed Ping Limit PC104 sonar system card.
16	Dual Frequency + High Speed Gain + High Resolution Gain + High Speed Ping Limit PC104 sonar system car.

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For those sonar system cards that were shipped with Sea Scan PC High Speed version 1.0.4 or below, the card will report itself as a Board ID 2 card. You will have to enable the High Speed Ping Limit and the High Speed Gain features in the SSPC.INI file.

For those sonar system cards that were shipped with Sea Scan PC High Speed (HS) version 1.0.5, the card will report itself as a Board ID 2 card. You will have to enable the High Speed Ping Limit, the High Speed Gain, and the High Resolution Gain features in the SSPC.INI file.

For those sonar system cards that were shipped with the Sea Scan PC Extended Gain (EG), the card will report itself as a Board ID 2 card. You will have to enable the High Resolution Gain feature in the SSPC.INI file.

7.7 Reference Lists

This chapter lists a number of books, videos, products, and organizations that have been referred to and/or recommended in the text of the manual.

7.7.1 Books

1) Fish, John P. and H. Arnold Carr, *Sound Underwater Images: A Guide to the Generation and Interpretation of Side Scan Sonar Data*. ISBN: 0936972149	American Underwater Search and Survey, Ltd. Box 768-B Cataumet, MA 02534 (508) 564-6500
2) Mazel, Charles, *Side Scan Sonar Record Interpretation.* ISBN: 0932146503	Peninsula Publishing 26666 Birch Hill Way Los Altos Hills, California 94022 United States (650) 948-2511 /http://www.sound-acoustic-books.com/

7.7.2 Videos

1) *Not in the Manual Guide® To Side Scan Sonar and Magnetometer Surveys*	Black Laser Learning P.O. Box 1385 Hockessin, DE 19707 http://www.blacklaserlearning.com/
2) *Sonar Operator's Not in the Manual Guide® To Side Scan Sonar and Image Interpretation*	Black Laser Learning P.O. Box 1385 Hockessin, DE 19707 http://www.blacklaserlearning.com/

7.7.3 Products

Tripp-Lite inverter	Trippe Mfg. Co. 500 North. Orleans Street Chicago, IL., 60610-4188 (312) 329-1777

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7.7.4 Organizations

National Marine Electronics Association

P.O. Box 3435
New Bern, NC 28564-3435
(919) 638-2626

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Section 8

- **Contact and Support Information**

8 Contact and Support Information

For technical support please contact us using one of the methods listed below:

Phone: (804) 693-9602
Toll Free: (800) 447-4804
Website: www.marinesonic.com

Business Hours: 8:00 AM to 5:00 PM EST

Additional documentation can be found on our Sea Scan PC Documentation page which can be found by going to our web site and following the links:
Downloads -> Sea Scan PC -> Documents

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Section 9

- **Revision History**

9 Revision History

Version	Comments	Issue Date
1.8.5	Added contact information and details for the SeaSpy Magnetometer.	July 2011

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